Education for industry on the North East coast

Harding, Richard

9, Percy Terrace,
Sunderland.
15th February 1934.

THESIS

FOR THE DEGREE OF

MASTER OF EDUCATION.

1934.

BY

Richard Harding.

Bachelor of Science (Dunelm 1930)
Naval Architecture.
Diploma in Theory and Practice of Teaching and Board of Education Teaching Certificate (Dunelm 1932)
Associate Member N.E.C.Institution.

Swan Hunter & Wigham Richardson, Ltd.,
Scholar (1927-30).

City & Guilds of London Metalwork Certificate 1933.

Assistant Master,
Junior Technical School,
Sunderland.
And Lecturer at the Villiers Street Evening Technical Institute.

And Sometime on the Staff of Messrs.Swan Hunter & Wigham Richardson,Ltd. Neptune Works, Newcastle-on-Tyne,(1925-31).

Attended The "Short Course for Engineering Teachers" Merton College, Oxford, July 1933

Other Theses and Papers Produced.

For D.T.h.P.T.
"The Junior Technical School as a Training Ground for Industry as compared with other Types of Schools" 1932.

For Graduate Section N.E.C.Inst.
"

"Psychology In the Shipbuilding Industry" 1930.(Graduate Award Prize).
"The Automatic Stabilization of Ships" 1931. (Graduate Award Prize).

EDUCATION FOR INDUSTRY ON THE NORTH EAST COAST.

C O N T E N T S.

Page.

CHAPTER 4 (Continued).

CHAPTER 5.

School and Employment.

CHAPTER 6.

Juvenile Unemployment.

D I V I S I O N III

The Provision and Regional Organisation of Technical Education on the North East Coast.

CHAPTER 7.

D I V I S I O N IV

I N D E X.

OF MAPS, CHARTS, DIAGRAMS AND GRAPHS.

STATISTICAL TABLES.

(See Appendix 5).

TABLE 1.
"Apprentice Permeability" in Various Industries.

TABLE 2.
Age at which Boys commence Apprenticeship in Various Districts.

TABLE 3.
Proportion of Male Apprentices under Written or Verbal Agreements and of Learners employed in each District.

TABLE 4.
The Growth of the Junior Technical School.

TABLE 5.
Juvenile Unemployment at Sunderland during 1933.

TABLE 6.
Juvenile Placings by the Sunderland Juvenile Advisory Committee.

TABLE 7.
Early Training and Schools attended by Males under 30 years (claimants for Unemployed Benefit).

TABLE 8.
Age of Leaving School of those claiming Unemployed Benefit, of all ages up to 30 years.

TABLE 9.
"Difference Chart", Difference in % of Indentures or other written Agreements and Verbal Agreements in each District, compared with Percentage of Apprentices in each District.

TABLE 10.
How Pupils move from Elementary Schools into other types of Post Primary Education.

TABLE 11.
Age at which Boys Commence Apprenticeship.

TABLE 12.
Occupational Analysis of Junior Technical Schools in the area.

TABLE 13.
Occupations of Secondary School Leavers, in variousSchools.
(a) Bede School
(b) Rutherford College Secondary School.
(c) Northumberland County Secondary Schools.
(d) Wallsend Secondary School.

TABLE 14.
Occupational Analysis of Heaton Junior Technical School.

I N T R O D U C T O R Y

C H A P T E R.

"EDUCATION FOR INDUSTRY ON THE NORTH EAST COAST".

INTRODUCTORY CHAPTER.

The Aim and Scope of the Thesis.

The aim of this Thesis has been to provide a source book of information to be used for the vocational guidance of all types of students, and also for the regional planning of technical education in the North East Coast area.

The subject matter can be classified into four main divisions, each division contains several chapters or sections dealing with different though connected aspects of some particular problem as follows:-

(1) A Scientific Study of Modern Industrial Tendencies in the North East Coast Area.
   (a) The Area Surveyed.
   (b) A Brief Industrial History of the Area.
   (c) The Present Industrial Tendencies of the Area.

(2) Modern Tendencies in Recruitment to Industry in the Area
   (a) The Recruitment of Apprentices to Industry.
   (b) How various types of schools supply Recruits to Industry.
   (c) Juvenile Unemployment.

(3) The Provision and Regional Organisation of Technical Education on the North East Coast.

(4) Vocational Guidance.
   (a) School Occupational Analysis. A graphical Statistical Method.
   (b) Vocational Guidance.

There is also a "Memoranda" which is by no means less important than the main divisions of the Thesis. In this chapter, the lines of advance of technical education both in this country and in foreign countries have been indicated and in addition there is information on the aims of various types of schools, and a classified bibliography of the important publications used in this Research.

The Sources of Information.

The survey of the character of the industries in the area and the past history of such industries was chiefly accomplished by means of bibliographical research. The modern tendencies of the present industrial position were worked out chiefly by means of "Vertical Charts", which were made to compare the phases of the mechanical invention and industry as represented in this area, with National and World phases of invention and scientific progress. The writer also visited many of the important works in the area in the course of his professional training for the shipbuilding industry.

In order that the information collected on the modern tendencies of recruitment ~~of~~ to industry could be used for purposes of analysis and vocational guidance the writer deliberately used statistics taken from the authorative survey on "Apprenticeship Training" produced by the Ministry of Labour in 1928 (see bibliography). The writer has produced a graphical analysis from certain of these statistics and which he has used to give evidence of the modern tendencies in the recruitment of apprentices. The analaysis of the prospects of apprenticeship on the North East Coast was accomplished by comparing the modern tendencies and prospects of the various industries with the "Apprentice Permeability" of such industries and their tendencies in methods of training apprentices. The writer was able to supplement and modify much of the information he obtained on methods of training and selection of apprentices by his own actual experience and observations made as an apprentice.

The chapter on "School and Employment" is almost entirely the result of practical research work by the writer, and in the majority of cases the statistics were obtained by the writer himself after analysing school record cards and registers, and by visiting many schools and interviewing many headmasters in the area.

An account is included of the discussion which took place at the "Short Course for Engineering Teachers" held at Merton College, Oxford, in July 1933, on a method of approaching Engineering Science from Energy Considerations. The writer has indicated the close ~~xxix~~ correlation between such an approach and the evolution of the chief industries in this area.

Juvenile unemployment was first studied by research in publications of the National Juvenile Advisory Council and in other Ministry of Labour publications. This research was followed up by personal interviews and visits to Junior Instruction Centres. The work on this subject was intentionally restricted in scope as great changes are foreshadowed in the provision of Juvenile Instruction by a recent Government Bill.

The chapter on the Provision and Regional Organisation of Technical Education in the area is entirely the result of

practical research work, including interviewing, visiting, correspondence and analysis of prospectuses of all the Technical provision in the area. Although the writer visited the more important centres of technical instruction, he received very special assistance in his research from the Director of Education for Northumberland and the Director of Education for Durham County. The writer was provided with an authoritative statement on the provision of technical education in Northumberland also with prospectuses of Evening Classes. The Director of Education for Durham County provided the writer with a complete set of prospectuses for all Evening Classes held in the County of Durham, and from this informatiom, together with much other information which he obtained from other acknowledged sources, he was able to give a comprehensive survey of all the technical facilities provided in the area, and methods of regional organisation.

The statistics of the Composition of Higher Technical Classes at Sunderland and Rutherford Technical Colleges were obtained by the writer after analysing records cards and enrolment forms. At Sunderland the writer also analysed enrolment forms in order to determine the proportion of students travelling to the College from outside the Borough. Other statistics were provided by the Principals of the various Colleges and are acknowledged.

The methods of vocational guidance have been suggested in the form of directions on how to tackle particular problem by using the type of information provided in this Thesis. Psychological tests have been excluded from the scope of this book.

A graphical-statistical method of analysing the occupations of leavers from any type of school or institution has been developed from practical research work undertaken by the writer at the Heaton Junior Technical School.

In the memoranda the occupational nomenclature was determined by the writer before commencing research into the occupations taken up by school leavers.

The recommendations on the provision of tehcnical education were extracted from the most recent official publications and are intended to be used for the purposes of comparing local

and national lines of advance in technical education. Other information in the Memoranda was obtained by bibliographical research and is chiefly concerned with the provision of technical education in other countries.

A Reference Summary.

A complete Summary of each of the four divisions into which this Thesis has been divided will be found in the following chapters and sub-sections.

The writer does not consider that a complete Summary of the Thesis, based on the above Reference Summary, would serve any useful purpose, OWING TO THE VARIETY OF SUBJECT MATTER the particular purpose of this Thesis is to present information in such a way that it can be used to solve particular problems of Regional Organisation and of Vocational Guidance.

The writer would like to suggest that the division on the "Provision and Regional Organisation of Technical Education on the North East Coast" could be used as a source of information on Problems of Regional Organisation. It

would appear that there is scope for a "Regional Organisation Council" , which would regulate Capitation and Travelling Fees in the whole Area, one of the most important jobs of this Council would be to remove all barriers from "Unique Courses" in certain Regions (indicated) and all students would be permitted to attend such courses without additional expense, when there was no alternative provision nearer their homes.

Another important item for the consideration of this proposed Council would be to promote more Courses of an adaptable nature, TO ASSIST INDUSTRIAL TRANSFER PROBLEMS.

Vocational Guidance in this Area should be given after a survey of the Industrial tendencies in the Area, followed by an enquiry into the methods of Recruitment and Apprentice Training existing in Industry within the Area, then the educational requirements of the Student could best be satisfied if a survey of the existing facilities for Technical Education in the Area were available.

The division on "Vocational Guidance" gives further information on methods of giving Vocational Advice in this Area.

ACKNOWLEDGMENTS.

The writer wishes to record how much he appreciates the consideration and assistance he has received from all persons and Authorities approached in the course of his investigation.

H.M.I.Mr.S.H.Stelfox suggested that the analysis of Higher Technical Evening Classes above the First Senior Year of the Group Courses would be a more useful indication of the type of Recruit to Industry, than if the analysis were made to include all years of the Evening Courses as was originally intended by the writer.

The Directors of Education of the undermentioned Authorities provided the writer with valuable information concerning the provision of Technical Education under their respective Authorities:- C.Williams, Esq., County of Northumberland; T.B.Tilley, Esq., County Council of Durham; W.Winter, Esq., Gateshead; S.Oldroyd, Esq., Tynemouth and A.C.Snaith, Esq., Secretary to the Durham County Council.

Mr.W.Thompson, Inspector and Supervisor of Schools for Sunderland, provided the writer with much useful information and arranged several interviews for the writer with other Authorities.

The Principals of the three Premier Technical Colleges, Dr.E.C.Edgar of Rutherford College, Dr.T.J.Murray of Constantine College and E.R.Verity, Esq., of Sunderland College, allowed the writer to use much of their private information. V.A.Mundella, Esq., the past Principal of Sunderland College also assisted the writer in his research.

Professor Frank Smith and The Registrar of Armstrong College, W.S.Angus, Esq.assisted the writer in his study of the Provision of Technical Education at Armstrong College.

The Headmasters of the Heaton, Atkinson Road and Sunderland Junior Technical Schools permitted the writer to obtain Statistics of Occupations and other information.

H.R.Armit, Esq., Secretary of the Sunderland Juvenile Advisory Committee, provided the writer with information on Juvenile Unemployment.

ACKNOWLEDGMENTS (Continued).

The writer also wishes to express his indebtedness to the following persons who so kindly assisted him:- F.Baldwin, Esq., Principal, Stockton Technical School (Evening); J.W.Angles, Esq., Principal, Darlington Tech.Coll.; J.F.Robinson, Esq., Headmaster, Sunderland Junior Tech.School, .Mole, Esq., Headmaster, Heaton Junior Tech.Sch.; J.W.Buckham, Esq., Headmaster, Atkinson Road Junior Tech.Sch.; R.S.Reed, Esq., Principal, West Hartlepool Technical College; J.W.Collier, Esq., Assistant Director of Education for Northumberland; Dr.A.D.Merriman, Headmaster, Wallsend Secondary Sch.; Mr. J.Maw, Esq., Headmaster, Rutherford Secondary School; Major Dawson, Headmaster, Jarrow Central Sch.; T.Mills, Esq., Headmaster, Middle Street Central School, Walker-on-Tyne; Captain F.Cook, Superintendent of the Sunderland Junior Instruction Centre; G.A.Bradshaw, Esq., Headmaster, Bede Collegiate School, Sunderland; R.Harrison, Esq., Foreman, Jennings Winch & Foundry Co., Sunderland.

The writer also wishes to record that he obtained much valuable information while attending a "Short Course for Engineering Teachers" at Merton College, Oxford, July 1933.

D I V I S I O N I

A Scientific Study of Modern Industrial Tendencies in the North East Coast Area.

CHAPTER 1.

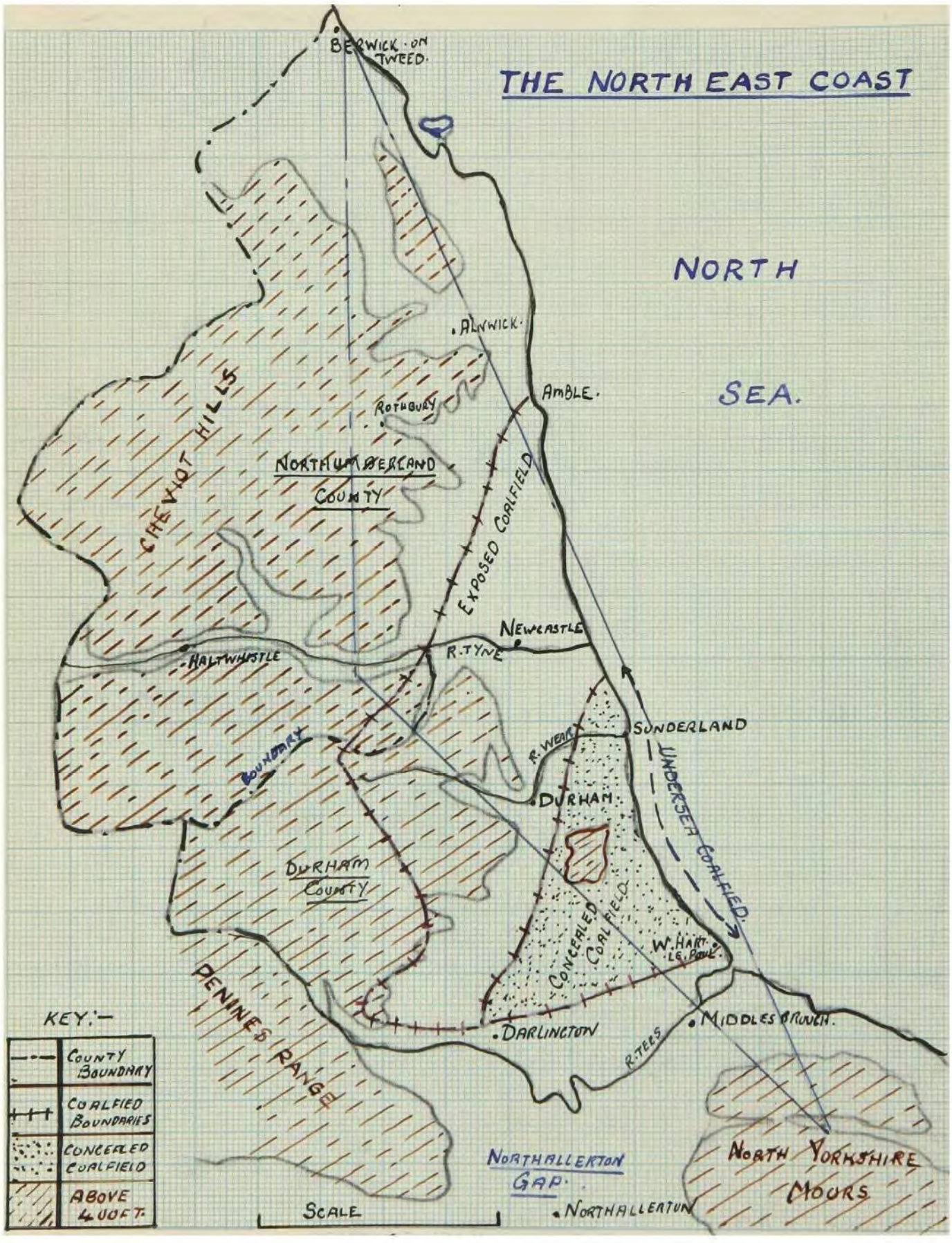
The Area Surveyed.

CHAPTER 2.

A Brief Industrial History of the Area.

CHAPTER 3.

The Present Industrial Position of the Area.


THE NORTH EAST COAST
BERWICK · ON TWEED.
NORTH
SEA.
ALNWICK.
AMBLE.
ROTHBURY
CHEVIOT HILLS
NORTHUMBERLAND COUNTY
EXPOSED COALFIELD
NEWCASTLE
R. TYNE
HALTWHISTLE
SUNDERLAND
R. WEAR
UNDERSEA COALFIELD
DURHAM
BOUNDARY
DURHAM COUNTY
CONCEALED COALFIELD
W. HART. LE. PEEL
PENNINES RANGE
DARLINGTON
MIDDLESBROUGH.
R. TEES
NORTHALLERTON GAP.
NORTHALLERTON
NORTH YORKSHIRE MOORS
SCALE
KEY:—
COUNTY BOUNDARY
COALFIED BOUNDARIES
CONCEALED COALFIELD
ABOVE 400FT.

THE AREA SURVEYED.

Geographical Factors.

The natural features of the North East Coast of England, served to remotely separate the Area from the other great industrial centres of the country. The area is roughly an ~~isosceles~~ isosceles triangle in shape, the base of the triangle is the seaboard extending from the Cheviot Foothills to the North Yorkshire Moors a distance of about 100 miles. One leg of the triangle is the Cheviot Range of Hills on the N.W., and the other leg is made by the Pennine Range to the West and South West. (see map).

These inland barriers are broken by three main gateways. To the west, at the apex of the triangle is the Tyne Gap, in the south there is the Northallerton Gap, and in the North a route exists between the Cheviots and the sea.

The three important rivers, the Tyne and the Wear and the Tees, render the area accessible to shipping, which provides the chief means of distributing the products of the area.

Industrial Factors.

The North East coast can be divided into four regions of industrial activity:-

(1) The Tyneside Region
(2) The Wearside Region
(3) The Teesside Region
(4) The Coalfield Region

The three riverside regions together with their accompanying coalfield hinterlands have common industrial interests and are rival competitors in shipbuilding, shiprepairing, marine and general engineering and the export of coal and coke. Each riverside also competes in the import of foodstuffs from Scandinavian countries. The Teesside region has important chemical industries and shares the Iron and Steel industry of the area with the Consett Ironworks of North West Durham.

In the past, the remoteness of the area from

National markets has apparently prevented the establishment of those industries which require a centralised distributive position with easy access and communication with other distributive centres of the country.ϕ Economic factors have therefore narrowed the main activities of the area to the exploitation and development of the raw materials found within the area, and to the distribution of food supplies from Scandinavia. The main heavy industries of the area are of considerable national importance, since they are basic in character and represent the main exporting industries of the country. It is significant that all of these main industries make use of sea transport for the distribution of their products.

Geological Factors.

The area is particularly rich in raw materials such as Coal, Ironstone, Lead, Road Metal and Building stone, Clays and Refractory Materials, Limestone, Cements, Magnesia, Gypsum, Salt and Anyhydrite.

The Coalfield.

The Northumberland and Durham Coalfield occupies about one quarter of the total land area of the North East coast, it extends about 50 miles down the coast from Amble to Hartlepool, and the maximum distance of colliery workings from the coast is about 25 miles, while the average distance from colliery to port is about 10 miles, ϕ This fact is of considerable economic importance to the coal exporting industry.

ϕ In some cases the collieries are less than 2 miles from the ports.

The coalfield consists of a surface and concealed part, the concealed part lies in a belt of about 12 miles width along the Durham coast and is distinguied by its high volatile qualities which make it the best gas coal in Europe.

ϕ See also "Industrial Survey of N.E.C." Chapt.on "The Prospects of a North East Coast Area by H.M.Hallsworth.

Note. (by writer) This remoteness of the area is being overcome by improved transport facilities now available,

Adjacent to the concealed belt is a surface belt which has a lower volatile quality and is used for coking purposes. The coalfield is also famous for its Steam, Bunker, and Household coals.

The Coking Coals are now largely depleted and are found in the surface region between the rivers Tyne and Wear. The greatest coal reserves are now found in the concealed coalfield; this has resulted in a greater concentration of population along the Durham coast, than in any other region of the area. The existing coal reserves have been estimated to maintain the present output for about 150 years, but the winning of coal will become increasingly more difficult as the best and cheapest coal has already been worked. The seams left are relatively thin and in order to keep down working costs, improved mechanised methods of working will have to be utilised ϕ

Other Minerals.

Iron Ore was mined in the West of Durham until a few years ago when working became economically impossible. Iron Mining is still done in the Cleveland district of Yorkshire where local Ore is blended with foreign Ore of better quality. The following is a list of other minerals found in the area:

> Lead, Zinc, Fluospar, Barytes (Barium Sulphate) Witherite, (Barium Carbonate), Road Metal or Whinstone (Lava Rock),"Boulder Clay", Refractory Materials (Ganister and Fireclays) and Magnesiam Limestone.
> The Teesside Region is rich in Salt, Gypsum, and Anhydrite. All of these materials are extensively used by the firm of "Imperial Chemical Industries Ltd.)

Population Factors.

The North East Coast has an Area of about 3,000 sq. miles and it occupies 1/18th of the land area of England and Wales. The census of 1931 gave the population of Durham and Northumberland as 2,243,000 (nearest thousands), but as the part of North Yorkshire is considered as belonging to the North East Coast Area it is necessary to add a correction to this total.

ϕ See also "Official Industrial Handbook" for Sunderland Borough and "Northumberland and Durham Coalfield" No.2 Survey by Department of Scientific and Industrial Research 1933.

This correction was carefully worked out for the purposes of a recent Industrial Survey of the Area ϕ and the total population of the North East Coast Area for 1931 was given as 2,496,559 persons or about 1/16th of the population of England and Wales. (Including North Yorkshire, Cleveland district). This population has shewn some decline in the Post War Years and the 1931 census indicated to some extent localities in which population changes are taking place.

In England and Wales 28 large towns recorded increased population in excess of 10% and 25 large towns recorded decreases as compared with the 1921 census. There were 3 large towns on the North East coast shewing decreases and no town in the area increased in population by more than 10%.

Towns shewing a Decrease in Population (1921-31)

South Shields	4.3%)	
Gateshead	2.2%)	Tyneside Region
West Hartlepool	0.7%)	Teesside Region.

These percentages record a movement of population away from those towns rather than an actual migration of such persons from the Area. In the Tyneside Region the migration may have been caused to some extent by the desire of the inhabitants to live in better residential areas outside of the town; and in the Teesside Region a probable cause would be the attraction of the Billingham Works of Imperial Chemical Industries.

The census for 1931 also revealed some facts concerning the proportions of males and females in the area as follows:-

Extract. "Sexes" Page XX Prelim.Census 1931.

"It is curious to observe that in Durham and Northumberland the greatest increase in the male representation is recorded, suggesting that, in their case, the depression has been signalized by an outward movement of the women rather than of the men".

Employment Factors.

The Industrial Survey on the North East Coast 1932 revealed that the Area was particularly badly hit by unemployment, and the percentages of unemployment for the Area ϕ2 have been

ϕ "See Industrial Survey of N.E.C."
ϕ2 " " " " " Page 501.

Unemployment on the North East Coast.

Year.	% Unemployed on N.E.C.	% Unemployed ϕ in Gt.Britain.
1924	12.8%	10·3%
1927	18.4%	9·7%
1929	14.5%	10·4%
1930	21.7%	16·0%
1931	34.1%	21·4%

More than 50% of the insured workers of the area are occupied in the basic industries of the country such as Coal Mining, Iron and Steel Manufacture, Engineering, Shipping, Chemicals and the Building and Repair of Ships. It is therefore to be expected that the economic welfare of these workers will depend to a large extent on the state of world trade.

The distribution of the insured workers in various occupations of the area have been obtained from the "Industrial Surveyof the N.E.C." 1932, and the percentages given indicate to some extent the present distribution, as there has not yet been sufficient trade recovery to absorb the unemployed in each insured occupation. The only alterations to the insured percentages would be caused by the workers leaving a trade or changing an occupation, and very few do this.

Occupations of Insured Persons on the North East Coast. (1931)

Industry.	% of Total Insured Persons.	
Coal & Coke	29%	
Iron and Steel	5%	
Engineering	8.4%	
Shipbuilding	7,2%	
Chemicals	1.7%	
Shipping & Waterside	4%	
	55.3%	Basic Industries.
Building & Contracting	7.4%	
Woodworking & Furniture	1.0%	
Printing & Paper	1.3%	
Food, Drink, Tobacco	2.1%	
Distributive Trades	12.6%	
Hotel,Boarding House, Club, Service.	2.3%	
Road Transport	2.6%	
All Others	15.6%	
	44.7%	Minor Industries.

Note:- "Industrial Survey of N.E.C." Page 500.
Total number of insured persons on the N.E.Coast in 1931 was 712,090 persons.

ϕ From Ministry of Labour Report 1932.

A BRIEF INDUSTRIAL HISTORY OF THE AREA.

The modern tendency in the present industrial position of the Area can only be understood by some reference to the state and nature of the industrial activities of the North East Coast during the 19th century. During the last century great changes took place in the character of the industries in the Area, the nett result of these changes was to bring about a great concentration of labour and resources upon a few staple industries to the neglect of several industries of apparent minor importance at that time.

The Tyneside Region.

The Tyneside is the oldest industrial region in the area and its claims to that position dates from the monoply on the London coal trade held by Newcastle from the 12th to the 19th centuries. Coal is stated exported to London, but most of the coal is now sent to foreign countries. The Pig Iron and Wrought Iron industries passed from the Tyneside to the Teesside Region in the last century, and since the Great War the Steel industry has also been concentrated in the Teesside Region.ϕ1. The decline of the Tyneside Iron and Steel trades was chiefly due to the opening up of the Cleveland Hills iron mine and the more suitable coal found in South Durham for iron production.

A large chemical industry flourished on the Tyneside between 1820-90 and some of the processes became obsolete but/ and others were transferred to the other Regions. There are still a number of minor chemical industries on the Tyneside chiefly depending on natural resourses of Coal Witherite and Bauxite, and on easy access to supplies of Byrites, Zinc and Magnesia from overseas. These chemical industries are as follows:-

Lead Smelting and Manufactures, Solder & White Metals, Copper Extraction, Alumina Flux from Bauxite, Pigments from Antimony Oxide and Antimony Sulphide, Sulphuric Acid, Zinc Oxide, Magnesia and derivates, Soap Manufacture, Chemical Manure and Coking Plants and Gasworks By-Products, i.e. Tar, Benzole, Ammonium Sulphate, etc. ϕ2

ϕ1 Consett is the only Steelworks Centre apart from the Teesside.
ϕ2 "Industrial Survey of N.E.C." Page 299.

During the 19th century the following industries flourished and then declined before the end of the century:-

Glass-making, Salt, Paper-making and Grindstone Industries. Various reasons have been given for the decline of these industries and the evidence appears to suggest that the decline was chiefly due to the pre-occupation of the Region in the development of the Transmission and Heavy Constructional Industries which were better investments than the Minor Industries.

The vanishing prosperity of many industries in the Tyneside Region during the latter half of the 19th century was quickly restored by the huge increase in Iron and Steel Shipbuilding, together with the Marine Engineering, Electrical and General Engineering Industries. These industries were stimulated to an unnatural extent during the Great War when the Tyneside became a vast armament factory, the industries were further expanded to meet the Post War demand for merchant ship tonnage althought the armament work had considerably declined. Coal production and the economical utilisation of its by-products has been greatly increased by improved mechanised methods of mining, more extensive railway facilities, coaling staithes and port conveniences.

The Wearside Region.

The Wearside Region is industrially similar to the Tyneside Region in that during the latter half of the 19th century there was a concentration of labour in a few basic industries such as the Coal, Iron and Steel Shipbuilding and Marine Engineering industries, accompanied by a declining importance of practically all other industries in the Region.

The chief town in the Region in the County Borough of Sunderland, which is relatively of more importance than the Wearside Region than is Newcastle in the Tyneside Region, the reason for this prominence is that whereas there are many large towns in the Tyneside Region such as Gateshead, South Shields, North Shields, Wallsend and Jarrow; in the Wearside Region Sunderland is the only large town, and is one of the most self-contained and economically independent towns in the country. It

it is situated at the head of the River Wear and possessea a well-equipped Dock and Harbour system chiefly used for the export of coal and the import of timber and iron, it also possesses a pleasure resort at Roker, and has a comprehensive and up-to-date educational system with a shopping centre for the heavily populated industrial hinterland.

There has always been keen rivalry between the Tyneside and Wearside Regions and this antagonism can be traced back to Elizabethan times when the city of Newcastle somewhat selfishly guarded its coal trade monoply with London. The Wearside coal trade first became prominent during the Civil Wars 1642-51. Newcastle had Royalist sympathies and refused to supply coal to the "Rebel"City of London, but Sunderland supported the Parliamentary side and captured a large share of the London coal trade. From this time onwards the coal trade steadily increased and was greatly stimulated by the subsequent improvement in the river, dock, and port facilities undetaken by the Wear Commissioners from 1717 onwards.

Sunderland became famous throughout the world for the building of wooden ships in the first half of the 19th century. During the latter half of the century iron shipbuilding became possible and steam engines were used for propulsion, this resulted in a considerable reduction in the number of shipyards and the building of much bigger vessels, the average size of a cargo boat now being about 10,000 tons capacity as compared with 250 tons capacity for wooden ships. The more reliable means of transport now available did much to steadily increase the demand for coal, and the need for ships engines resulted in the establishment of many marine engineering works.

Minor Industries of the Wearside.

The Pottery industry flourished on the Wearside 1750 to 1890 and about 3,000 people were employed at various times. The industry declined and became insignificant before the end of the century. The reasons for the decline were given

ϕ See also Official Industrial Handbook for Sunderland and "History of Sunderland" by W.C.Mitchell 1919 for Industrial History of the Wearside.

as foreign competition in the unprotected home market and foreign tariff barriers to pottery exports./61

/61 Victoria County History of Durham Vol.II chapter on industries by Miss Maud Sellers.
"Many of the potteries came into the market at the moment when the rapid deveopment of the iron and shipping industries led men to prefer to place their capital where a high rate of profit and a quick return could be commanded."

The Glass trade was in a vigorous state before the advent of iron shipbuilding and was stimulated by the invention of rolled plate glass by a Sunderland manufacturer who supplied much of the glass for the Crystal Palace building 1851. The industry declined and foreign competition was blamed, although the reasons put forward by Miss M.Sellers may have had something to do with the decline. There has been a recent revival in the Glass trade and there is now a steady demand for coloured glass and also for a special fire-resisting glass.

The Lime trade was established during the 18th century and the deposits of magnesium limestone were extensively worked during the 19th century for iron smelting, there is still a regular trade in magnesiam limestone, Further stimulated by the manufacture of hydrated lime.

Furniture manufacture has recently been vigorously developed and the Wearside is now producing more furniture than other regions in the area. Local foundries provide castings for bedsteads and wood bedsteads have become a speciality of the industry. Paper making is also a thriving industry on the Wearside and Sunderland is a chief port in the country for the import of Esparto grass. The timber trade is important and pit props are the chief items of the trade. Pitch, Creosote and Oil are manufactured and exported from Sunderland. The Building trades are particularly active in the Region and are expected to be so for some time to come as there is now a demand for better houses for the working classes.

The Teesside Region.

The Teesside Region developed at a later date than either the Tyneside or Wearside Regions and the prosperity of this Region was built on the iron and steel industry with the opening of the Cleveland Hills Ore Mines in the 30's of last century. As Durham coal is almost free from sulphar and phosphorus, not permitted in high grade steel, the Teesside Region became an ideal situation for the production of steel. Coke ovens and by-product works are run in connection with most of the modern steel works, and they provide subsidiary industries which have become of increasing importance since the War.

Darlington has specialised in constructional steelwork, and is famous as a bridge building centre. There are many minor industries in the Region which supply plant to the steel industry, such as blast furnaces and gas plants, etc.

Middlesbrough became the centre of activity of the Cleveland Iron trade in the 19th century, later it became the natural centre for the steel trades. About 30-40% of the iron and steel output of the Region is absorbed by the Area in shipbuilding, railway, tramways and general engineering industries, the remainder is either exported to other countries or to other parts of this country. Middlesbrough has now a population of about 150,000 yet in 1831 it had only a population of 154 persons, thus there has been a remarkable development in the last 50 years.

Great changes have taken place in the chemical industry of the area since the War, due to the enterprise of the Imperial Chemical Industries Ltd. at their Billingham Works in the Teesside Region. The value of chemicals and manures exported in 1913 was £1,800,000 and in 1929 was £5,388,000 ϕ, the value of these exports has fallen recently but the industry only appears to have had a temporary set-back owing to the depression. The Teesside has natural advantages as a centre for the chemical industry, there are large supplies of salt, anhydrite, gypsum, phosphatic slags, and coal by-products, which are used to manufacture fertilizes and other compounds from coal.

ϕ "The basic Industries of Great Britain" by Lord Aberconway.

Hartlepool is the port at the head of the Tees Estuary, it has extensive dock facilities for the handling of imported iron ore and timber, while it is chiefly concerned in the export of coal and chemicals (there is also a fish quay). There are shipyards and engineering works on the riverside chiefly at Hartlepool, Middlesbrough and Stockton. The Region is also a great shipowning centre although since the War there has been a movement of shipowners to London, and it is believed that this is partly responsible for the decline in shipbuilding in this Region.as compared with the Tyneside and Wearside Regions.

There is ample room for development in the Region, large tracts of flat land are available with easy access to the waterway and with excellent transport facilities. The industrial development of the Teesside resembles that of the Tyneside Region, in that several large towns share the industrial activities, whereas ~~xxSunderland~~ in the Wearside Region Sunderland alone carries the whole industrial responsibility,

The Coalfield Region.

The coalfield region of the area is formed by the vast industrial hinterland of/Northumberland and Durham coalfields surrounding the estuaries of the rivers Tyne, Wear and Tees.

In the early part of the 19th century the coal production of the region was enormously increased by the solving of the chief difficulties in mining, in 1784 the steam engine provided the means of clearing the mines of water, and in 1815 the Davey Safety Lamp came, together with a knowledge of the technique of mine ventilation. Railways were introduced in the 30's and they provided a means of developing the rich coal hinterland of the region.

Towards the end of the century the more easily won coal of the surface coalfield was becoming exhausted and there commenced a gradual opening up of the concealed belt of coal lying along the Durham coast. The last stage in the winning of the coal was begun with the introduction of the freezing process of shaft sinking in 1907 ϕ , this process made possible

ϕ Since opening of Dawdon Colliery in 1907.

the development of the "Undersea Coalfield" fringing the coast were previously the water bearing strata encountered had made shaft sinking impossible. The ever increasing difficulties met with in the winning of the Northumberland and Durham coal have demanded accompanying advances in mining technique, this has resulted in a more intensive application of mining technique than in any other coalfields in the country, the mines are rapidly becoming mechanised and the miners are often conveyed 3 miles out under the sea to the coal face, this mechanisation has resulted in a displacement of man power which is already an acute problem.

Durham coke is in great demand for steel making since it is free from sulphur and phosphorous ingredients which are now allowed in good class steel.About 5,000,000 tons of coke are prepared per annum from this coal. The coalfield also produces about 43,000,000 tons of coal per annum and it is the most important single industry of the area, employing about 30% of the people of the area while the output represents about 20% of the national output.

THE PRESENT INDUSTRIAL POSITION OF THE AREA.

Introductory.

During the 19th century the industrial history of the North East Coast was revolutionised by the development of the mechanical inventions of that time, in this area the development was chiefly concerned with the transformation of energy and the transmission of power in its many forms. Before the "Mechanical Age" man had been the chief source of power for doing work but the invention of machines raised man's state in the world above that of mechanical drudgery, he only became necessary for work which required skill and intelligence for its accomplishment.

For the first time, education became a survival factor in the changed conditions of life brought in by the mechanical revolution, and education for industrial efficiency or technical education became an important movement in the latter half of the 19th century, when it was clearly realised that the progress of industry depended on the application of scientific principles to industrial design.

From the nature of the problem of education for industry it is clear that there can be no unique solution, rather there must be an ever changing variety of special solutions to meet the ever changing educational needs of industry. It is therefore of primary importance that a brief, yet searching survey of the industrial evolution of the area and the modern tendencies of such evolution shall regulate the special provision of technical education made within the area.

The Evolution of the Mechanical Age Within the Area.

The first task of the "Mechanical Age" was that of power transmission and its application to the mechanising of transport on land and sea. The accomplishment of this task was made possible by the extended knowledge of metallugical technique which was available in the early part of the last century, and by the easy access to supplies of coal fuel.

MODERN INDUSTRIAL TENDENCIES

	DATE	NORTH EAST COAST — MECHANICAL & SCIENTIFIC DEVELOPMENT	GREAT BRITAIN AND WORLD — MECHANICAL AND SCIENTIFIC DEVELOPMENT	N. E. COAST — INDUSTRIAL CHANGES
COAL FUEL PHASE	18th CENTURY	SURFACE COAL FIELD DEVELOPMENT PRIMITIVE PUMPING ENGINES 1778 WOODEN SHIPS (PARTICULARLY ON WEARSIDE) COAL USED AS FUEL FOR IRON SMELTING & COKE.	TEXTILES - MECHANISATION OF INDUSTRY 1789 CARTWRIGHT POWER LOOM 1763 WATT STEAM ENGINE 1760 COAL FOR IRON SMELTING. 1790 STEAM BLAST CHINA & EARTHENWARE DEVELOPMENTS	POTTERY & GLASS INDUSTRIES FLOURISHING. TINPLATE & IRON INDUSTRIES FOUND ON TYNESIDE AND WEARSIDE AND NOT N. YORKSHIRE
STEAM TRANSMISSION PHASE	1800	STEAM TRANSPORT DEVELOPMENTS 1813 "PUFFING BILLY" LOCOMOTIVE USED NEAR NEWCASTLE. 1825 FIRST PUBLIC RAILWAY OPENED TO PUBLIC (STOCKTON TO DARLINGTON) 1830 THE "ROCKET" WINS MANCHESTER LIVERPOOL CONTR. CONCEALED COALFIELD COMMENCED 1835 CLEVELAND HILLS IRON MINES DEVELOPED 1858 FIRST IRON SCREW COLLIER BUILT ON WEAR. DEVELOPMENTS IN COMPOUND RECIPROCATING STEAM ENGINES. IRON SHIPBUILDING. REPLACING WOOD AS MATERIAL 1880 LAST WOODEN SHIP BUILT ON WEAR. "COPPENAMI" STEEL SHIPBUILDING. 1890 TURBINE DEVELOPMENTS. HIGHER PRESSURES OF STEAM FOR ENGINES. DEVELOPED. LOCOMOTIVES DEVELOPED.	TRANSPORT DEVELOPMENTS 1763 PADDLE STEAMER - (AMERICAN) W. HENRY 1797 FULTON " " 1812 BELL "COMET" STEAM NAVIGATION POSSIBLE 1819 "ROYAL WILLIAM" CROSSES ATLANTIC STEAM DRIVEN 1839 "CUNARD LINE" STARTS. 1790-1840 CANAL TRANSPORT DEVELOPED TO SOLVE HEAVY CARRIAGE PROBLEMS. 1815 DAVEY SAFETY LAMP MINE VENTILATION - RAILWAYS. MINE CAGES. 1830 IRON SHIPBUILDING. 1856 BESSEMER STEEL PROCESS 1864 OPEN HEARTH STEEL PROCESS STEEL SHIPBUILDING. IMPROVEMENTS IN BOILER PRESSURES. 1st 40 lbs □" IN 1850 TO 180-200 lbs □"	IMPROVEMENTS IN PORT FACILITIES IN TYNE AND WEAR REGIONS & TEES. DECLINE IN PIG IRON AND IRON MINING ON TYNE & WEAR AND TRANSFER TO N. YORKS. WEARSIDE INCREASED LIME TRADE DECLINE OF POTTERY AND GLASS IN AREA. GREAT CONCENTRATION ON IRON AND STEEL SHIPBUILDING, MARINE ENGINEERING AND IRON AND STEEL MANUFACTURE. IN THE AREA. DECLINE OF TYNESIDE BASIC CHEMICAL INDUSTRIES.
IRON & STEEL MANUFACTURING DEVELOPMENT				
ELECTRICAL DEVELOPMENT	1900	1906 "THE MAURETANIA" — GREAT ADVANCE IN SHIP PROPULSION AND DESIGN. GREAT VARIETY OF SHIPS BUILT ON TYNE AND WEAR & TEES. 1907 "UNDERSEA COALFIELD" DEVELOPED (DAWDON 1907 BY FREEZING PROCESS) 1914 "GREAT WAR" — ARMAMENTS GUNS - BATTLESHIPS - SUBMARINES etc. 1918 1920 GREAT INCREASE IN MOTOR TRANSPORT IN AREA. AND BETTER ROADS IMPERIAL CHEMICAL INDUSTRIES → LTD CHEMICAL MANURES - COAL COMPOUNDS etc.	1909 BLERIOT FLIES CHANNEL DIESEL TRANSMISSION IN GERMANY CHEMICAL DEVELOPMENTS METALLURGICAL DEVELOPMENTS NEW ALLOYS. OIL FUEL FOR SHIPS. MOTOR TRANSPORT DEVELOPMENT HIGH PRESSURE STEAM. AEROPLANE & SEA PLANE DEVELOPMENTS COAL USED FOR CHEMICAL PURPOSES	MECHANISATION OF COAL MINES MOVEMENT OF POPULATION TO COASTS WITH DEVELOPMENT OF UNDERSEA COAL FIELD AND CONCEALED COALFIELD INCREASING ATTENTION TO BY-PRODUCTS FROM COAL & COKE. GREAT WAR — ARMAMENTS DEVELOPED. INCREASING ATTENTION PAID TO MINOR INDUSTRIES BASIC INDUSTRIES DECLINE. DIESEL ROAD TRANSPORT & LOCOMOTIVES
DIESEL DEVELOPMENT	1930	1930 DIESEL TRANSMISSION FOR SHIPS DIESEL TRANSMISSION FOR ROAD TRANSPORT COAL — OIL — HYDROGENATION — LOW TEMP. CARBONISATION.		

The natural advantages of the area as a coal mining and iron and steel manufacturing centre made it possible for the area to excel in the pioneering tasks of the age. The progress of the mechanical revolution in the area closely corresponded to that of the main movement of the century and can be divided into the following phases (see charts).

(1) Coal fuel, energy conversion phase.
(2) Iron and steel materials, manufacturing phase.
(3) Steam transmission development.
(4) Electrical Transmission development.
(5) Diesel transmission development.

1. <u>The Coal Fuel Phase.</u>

For seven centuries the combustion of coal was regarded as the best means of producing heat energy, it was therefore natural for the early prime movers to be dependent upon this source of energy. Coal was first mined in the area for household purposes and then with the exhaustion of wood supplies it was used as a fuel for iron smelting. Coke was produced in the 18th century and later the discovery of the use of coal gas for lighting purposes created an increased demand for gas coal of the area, later the steam transmission phase further stimulated the demand for coal.

It is now realized that coal combustion is a wasteful way of producing heat energy and that as the efficiency of coal consuming industries increases there will be a falling demand for coal fuels either due to improved methods of coal burning or to the use of new fuels.[6] The two chief heat producing elements are carbon and hydrogen, the former has been used for centuries but it is only recently that hydrogen has been found to have a greater energy value than any other fuel. Combinations of carbon and hydrogen are known as hydro-carbons and have an intermediate energy value, they are found in nature as crude oil. Although hydrogen is the best energy producing fuel there are at present many disadvantages in using a gaseous fuel and therefore hydro-carbon oil fuels have become the chief energy producing fuels in the world with a consequent decline in the use of coal as a fuel.

Many ingenious attempts have been made in the area to stimulate the use of coal fuel; such as mechanical stoking,

[6] The demand for coal as a fuel may decline but the demand for coal for other purposes will increase.

Modern Industrial Tendencies

Coal

- Household Fuel
- Iron Smelting
- Coke
- By Products Tar, Benzol etc
- Pulverised Fuel
- Low Temp. Carbonisation & Chemical By. Products
- Hydrogenation
- Oil from Coal
- Chemical Compounds
- Mechanisation of Coal Industry
- Coal Displaced as Fuel. But not in Demand for Chemicals

Iron & Steel

- Smelting
- Puddling
- Steam Blast
- Mechanical Development in Working Overcome
- Ships, Engines etc
- Bessemer Steel Process
- Open Hearth Process
- Steel Replaces Iron
- Alloy Steels
- Non-Ferrous Steels

Transmission Industries

- Primitive Pumping Engine
- Mine Haulage
- Locomotives
- Steam Land Wagons
- Wooden Ships → Ships, Paddles Steamers
- Recip. Steam Screw
- Improvements in Compound Engines
- Higher Pressures
- Electrification
- Electric Lamp
- Turbo-Alternator
- Electrical Accessories
- Turbine
- Geared Turbines
- Turbo-Electric Developments
- Exhaust Turbines to Recip Engines
- Oil Fuel Systems
- Pulverised Coal Fuel
- Motor Car Engine
- Aeroplane
- Seaplanes
- Diesel Engine Ships
- Diesel Road Transport
- Diesel Electric. Developments

Minor Industries

- Glass
- Pottery
- Small Iron Goods
- Decline
- Building Paper
- Chemical Manufactures
- Minor Processes
- Food Preparation

pulvarised fuel and collodial fuel system. Recently a process for the conversion of coal into oil has been invented and is being developed on the Teesside Region. This process of "Hydrogenation" is concerned with the chemical combimation of the carbon in coal with hydrogen forming hydro-carbon oils. Great hopes are entertained in the area, that this process will not only stimulate the coal mining industry but provide employment for many people in this new industry.

Coal is rapidly becoming more important for its chemical value than its fuel value and the present phase is essentially the beginning of the chemical usilisation of coal for the production of oil, coal gas, coke and many by-products.

2. The Iron and Steel Phase.

The materials phase of the area began with the exhaustion of wood fuel supplies and the consequent transference of the iron industry from the South Weald to the North of England. The first developments occurred in the 18th century with the use of coke in iron smelting, and the ability to make sheet iron and rolled bars and rods. The greatest advances were made in the 50's and 60's of last century with the invention of the "Bessemer"and "Open Half" steel making processes which made possible steel shipbuilding and all other engineering progress of that time. The steel industry is now entering upon a struggle for the provision of new alloys to withstand the new conditions of increased stress and strain of temperature imposed by modern engineering advances. The mechanical problems of steel making and manufacture have been solved and the present phase is one of scientific research in quest of new alloys.

3. The Steam Transmission Phase.

The development of steam transmission has been followed more closely in this area than in any other engineering centre of the world, the primitive pumping engines used in the coal mines of the 18th century led to the invention of the "Rocket", the first locomotive to haul a passenger train on the first railway in the world between

Stockton and Darlington. With the advent of iron ships the marine reciprocating engine quickly solved propulsion problems and later the invention of the turbine was developed on the Tyneside from the "Turbinia" the first turbine driven ship in the world to the "Mauretania" which was the fastest liner in the world for more than 20 years.

Steam transmission still progresses in the area with the coupling of low pressure turbines to the exahust of reciprocating engines, together with the use of high pressure steam. However the demand for steam tonnage has fallen considerably and is now confined chiefly to British shipowners. The future of steam transmission appears to be coupled with electrical transmission in the production of turbo-electrical generating and power units for a variety of purposes.

4. The Electrical Transmission Phase.

Electrical power transmission has played a great part in the modernising of the engineering works of the area. This electrification was mainly completed by the end of the 19th century and did much to increase to productivity of the area.

The area became outstanding for the development of high speed turbo-alternators and for the electrical propulsion of ships. Electrical accessories are produced for other industries such as flame-proof mining equipment, electric winches, switch gear and "grid work". The only attempt so far to produce an article depending upon a national sale for its success is in the production of a vacuum cleaner. (American). Much remains to be done in the development of lighter electrical manufactures, for although the area is the home of the electric incandescent lamp very little has been done in the further production of this article.

5. The Diesel Transmission Phase.

The Great War seriously retarded the early stages of the Diesel phase both in this area and in this country, during this time foreign countries particularly Germany took the lead in Diesel transmission and it was not until after the War that firms in this area were able to compete with foreign countries

in Diesel ship propulsion. (Germany continued Diesel research in Holland during the Great War). However this area has already taken the lead in the application of Diesel transmission to the mechanising of locomotives and motor transport vehicles. Further developments are expected in the production of Diesel electric generators for many purposes.

Shipping and Shipbuilding.

The North East coast is the greatest shipbuilding and shiprepairing centre in the United Kingdom, this superiority was first won in the early part of the 19th century with the building of wooden ships, and later the area became the natural centre for the building of iron and steel ships. All types of shipping have been built on the rivers, such as the largest passenger liners and the greatest battleships and floating docks in the world. This coast is also famous for the building of oil tankers, cargo boats, cable laying ships, ice breakers and refrigerated cargo ships, besides its ability to turn out any type of Admiralty work.

Shipowning is one of the oldest industries of this coast and it dates back to a time before the 12th century when the coal export trade commenced. Shipownrs in the area now control about 500 vessels representing about 7% of the total British merchant tonnage. The future of shipping and shipbuilding in the area is obscured, foreign subsidized shipping and shipbuilding are serious competitors to our own unassisted industry.

The shipyards of the area were greatly increased in capacity and efficiency both during the War and afterwards to replace lost tonnage but now the yards are suffering from over-capacity and a diminished flow of work.

The Labour Position.

All industries in the area were immensely stimulated both during the war and for some time afterwards and the 1924 census revealed that 2/3rds of the insured population of the area were employed in the heavy industries such as coal, iron and steel, engineering, shipbuilding, chemicals, shipping and waterside services. By the 1931 census these heavy industries could only support 1/2 of the insured population.

This displacement was caused by a decline in the basic exporting industries due to world economic troubles and foreign competition and only to a relatively small extent to the effects of mechanisation, since the unemployment occurred chiefly in those industries which did not lend themselves to mass production.

In certain heavy industries the unemployment in the area is a greater percent than for the country, and apart from the reasons already given for this unemployment a careful scrutiny of the charts (P.14.) and a study of the evolution of the phases of the mechanical revolution, suggests that in this area the steam transmission phase and the coal fuel phase have been somewhat unduly prolonged relatively to world and national scientific progress. Furthermore the steel industries have not developed the use of the new alloys to the sameextent as other leading centres of the steel industry such as Sheffield.

Thus the present time is a period of adjustment to the changing phases of the mechanical revolution and the beginning of scientific developments in the basic industries. However as the heavy industries are unable to absorb more than 50% of the insured workers, many light industries have been developed and provide promising openings for the displaced labour. The following light industries shew promise of further expansion:-

(1) Building Trades, materials and Public Contracting.
(2) Furniture Making, Saw mills.
(3) Printing, Paper and Paper Box Making, etc.
(4) Food, Drink, Tobacco and Food Canning.,etc.
(5) Distributive Trades.
(6) Hotel, Boarding House, Service, etc.
(7) Road Transport.
(8) Glass, Twine, Rope and Minor Trades.

Of the engineering industries shewing promise of further activity and development there are the following:-

(1) Electrical Engineering.
(2) Constructional Engineering.
(3) Motor Vehicles, Cycles and Aircraft.
(4) Stove, Grate, Pipe, General Ironfoundry.
(5) Electric Wiring and Contracting.
(6) Minor Metal Trades, i.e. Plumbing, Tinsmith, Ironmongery.

Note. See also "Industrial Survey of N.E.C." Page 144.

The Educational Significance of the Present Industrial Position.

The essential fact emerging from the present industrial position is that the greater part of the population is employed in either the export of coal and coke chiefly in its first stage of production or in the re-export.of iron and steel produce made largely from imported ores.

There has been a decline in the prosperity of both of these main activities and a consequent serious decline in employment. As a result of this displacement of labour in the heavy industries the Minor industries of the area are being looked to as an alternative occupation.

It is suggested from the evidence collected that apart from all other reasons for a decline in prosperity of the area, the present time is a period of re-adjustment and changing phase in both of the main activities of the area. The coal mining industry is rapidly becoming mechanised and reorganised in preparation for the chemical stage of production.In future coal will probably not be exported in its raw state, but at an advanced state, as chemicals or oil.

The iron and steel manufactures of the area can be broadly classified as either mechanisms for power transmission or as heavy constructional steelwork.

Steam transmission of power has declined relatively in importance to Electrical and Diesel methods of transmission, but combinations of transmission ,echanisms such as Turbo Electrical Diesel Electrical and Turbo Reciprocating Steam methods offer scope for further development.

Heavy constructional steelwork has already reached its maximum development within the area in the making o: such things as ships, armaments, bridges, floating docks, caissons, railways and building girders.

The future prosperity of the area does not apparently lie in a further stimulation of phases of industry which have already passed their zenith such as the heavy constructional steel industries.

However there is a possibility of developing the light constructional engineering trades, and in the manufacture of small articles requiring a large sale. The development of the aircraft industry is long overdue in this area where the combination of technical experience and natural advantages are superior to those in any other part of the country for the engineering trades. A vital factor which may determine the final location of the aircraft industry is that as the size of aircraft increases the industry will tend to be drawn to the coasts, since land aircraft cannot at present be built to the same size as sea planes owing to landing difficulties. The main industrial developments anticipated on the North East Coast can be set down as follows:-

(1) Mechanisation of the coal industry and the chemical utilisation of coal.Transformation of coal into oil.

(2) Developments in combinations of mechanisms for power transmission (i.e.Diesel Electric etc.)

(3) Developments in Minor industries such as Building, Furniture making, Food distribution and preparation, Glass making etc.

(4) Developments in Light engineering industries and the manufacture of small articles. Aircraft industry.

(5) Reorganisation of heavy constructional industries.

The North East Coast therefore requires a deliberately planned scheme to provide technical instruction for the needs of the future workers in the Area; if this provision of technical education is overloaded with information exclusively concerned wit passing or past phases of industrial development in the Area, it will tend to aggravate a major problem of the "Scientific Age" which is the unemployment of skilled workers and specialists through Technical Changes in Industry.

It is therefore of first importance that the technical provision of the Area shall include facilities for adapting the workers to Technical changes in industry, and that the organisation of the whole scheme of Technical Education shall intelligently anticipate the demands of the scientifically controlled orientations of industry.

D I V I S I O N II

Modern Tendencies in Recruitment to Industry in the Area, and a Study of Recruitment from Various Types of Schools.

CHAPTER 4.

The Recruitment of Apprentices to Industry.

CHAPTER 5.

School and Employment.

CHAPTER 6.

Juvenile Unemployment.

THE RECRUITMENT OF APPRENTICES TO INDUSTRY.

The History of Apprenticeship.

The present methods of training recruits for industrial efficiency have been evolved from methods used for the training of apprentices in the old Craft Guilds. Guild apprenticeship commenced in the 12th Century and was concerned with Craft training for the common trades then in existence. By the 14th Century apprenticeship became compulsory in all of the Guilds and only apprentice trained men in particular Crafts were allowed to work at them. Thus even this early stage of industrial history the horizontal mobility of the workers was checked by the eagerness of the Guild Master Craftsmen to identify themselves with their Crafts, and they caused many artificial barriers to be made round each group of common manual operations called trades.

The conditions of apprenticeship were such that the boy lived at the master's house and for his services the master provided board, lodging, clothing and training in lieu of wages, usually for seven years. Each Guild continued to make its own regulations for the training of apprentices, until the 16th Century when industry became to be regarded as of national rather than of domestic or local concern only.

This change in industrial conditions together with the conflicting regulations of the Guilds for their apprentices brought about a desire for uniformity in regulations for Guild training, and this desire found expression in the "Statute of Artificers" 1563. The Statute only fixed more rigidly existing conditions of apprenticeship which were in themselves already giving cause for dissatisfaction especially the rule governing the proportion of 3 apprentices to 1 journeyman, and one man for each boy over that number.

Apprenticeship was to last for at least seven years and it was not to be completed before the age og 24. As no provision was made to enforce this Statute the Guild members quickly disregarded it, particularly when they found it did not apply to trades not in existence at that date, and again only to townsmen.

By the beginning of the 18th Century all of the Guilds had more or less disregarded the Statute.[1] And to an increasing extent apprentices began to live out of their masters houses and to receive wages in lieu of board and lodging and keep. Premium apprenticeship commenced with the breaking up of the "living in system" and the sbustitution of the "living out system". The Statute was repealed in 1814 as it was no longer obeyed by the Guilds. The repeal was hastened by the transition of industry from a domestic craft system to a factory system and also by the "Laissez Faire".policy of the times which sought to remove all restraints from the expansion of industry.[2]

Apprenticeship was not abolished with the repeal of the Statute, but has continued in a voluntary form until the present day. In the 19th Century apprenticeship was chiefly found in those trades which demanded a high degree of skill or in trades which had changed little from the old craft processes. But when the increasing use of machinery made boy labour more profitable than ever before, apprentices became a menace to the security of the journeyman workers and the Trade Unions,which were now a very powerful organisations of workers made regulations to restrict the numbers of apprentices employed and the conditions under which they were to work.

The journeyman worker found it was unprofitable to train apprentices under him as he was now working on a"piece rate". During the war there was a large increase of boy labour in industry due to the withdrawal of the skilled men for military service. These youths were not given the chance

[1] See also "Newcastle on Tyne its Municipal Origin and Growth" C.D. Rendel 1898. Chap on "Guilds"

of an ordinary workshop training. Their training was sacrificed before the national emergency, and they were intensively specialised on particular operations. Furthermore, when they reached 18 years of age they were often taken for military service.

In 1918 the Board of Trade appointed a Departmental Committee which published a "Report on the Position of the Engineering Trades after the War", and this revealed a disquieting state of affairs in the apprenticeship system. The chapter on "Apprentices" revealed that the old system of indentured apprenticeship had been almost replaced by a looser bond which both the employer and worker were free to break.

There was a genuine complaint that apprentices were kept too long on machines of one type or on a particular operation, with the result that apprentices lacked the general knowledge and adaptability of the older generation of engineers.

It appeared that recruits to industry were influenced by the high rates of pay offered to learners as opposed to apprentices, who sacrificed immediate gain for the sake of gaining experience which would lead them to a better job in the future. The factors which helped this drifting in to learnership were the home circumstances of the youth, and also the fact that employers were inclined to regard youths who wanted to move round the works as a nuisance, and therefore this shifting round was discouraged as it interfered with production.

The position of the Technical Education of apprentices also left much to be desired and it was felt that voluntary Evening Classes did not do all in the form of education to provide for the supervisors and skilled workmen of the future.

The report suggested that if any compulsions were

ø "History of English Elementary Education in the 19th Century". F.Smith 1931.

applied to employers to provide adequate training for apprentices this should be restricted to about one third of the number of apprentices, and only those shewing promise in such trades as Moulding, Pattern Making, Fitting, and Turning. There would be strict selection and weeding out of unsatisfactory youths.

The Post-War position of apprenticeship was therefore one of grave concern and the future supply of labour to the skilled trades appeared to be in danger, this condition was aggravated by the return of thousands of men who had broken their apprenticeship to join the forces and who were disinclined to recommence at apprentice wages.

The only constructive effort made to solve this problem was advanced by the newly formed Ministry of Labour which took over the functions of the Board of Trade in labour matters in 1917, this Ministry formulated an interrupted apprenticeship scheme. It must be noted however that the Ministry did not offer a complete solution, they put forward an emergency scheme based on traditional methods of apprenticeship it was not a permanent solution and did not attempt to tackle the major problem threatened, by the increasing specialisation and use of machinery in industry.

By means of a Government Grant to employers, the workers received a wage equal to that which they would have received had their training not been interrupted during the War. Technical instruction was provided for all such men in Day Classes and Evening Classes, it was of a voluntary nature. Although these classes were only temporary yet they established the principle of Day Continuation Classes for all workers who wished to increase their industrial efficiency by such means. Many enlightened employers in the country permitted their apprentices to attend classes for technical instruction after the interrupted apprenticeship scheme came to an end, and this movement is steadily gaining favour at the present time. ~~The North East Coast is~~

SELECTION OF APPRENTICES.

Traditional Methods of Selection.

(a) Preference to Sons of Employees.
(b) Personal Interview with Foremen.
(c) References or recommendation.

These methods often lend themselves to abuse and the worst forms of favouritism when left to the judgment of foremen to select apprentices[ø]. The North East Coast Institution published a report on the "Education of the Engineer" and concluded that the whole system of selection of apprentices must be changed and the selection should be made by a member of the works and the Administrative staff in co-operation with the headmasters of Day Junior Technical Schools.[ø] (Transactions of the Inst.1930).

In many industries physical fitness is of first importance and only boys of good physique are signed on. This condition is becoming of increasing importance especially in industries where much outdoor work is done. A medical inspection is now part of the compulsory requirements of the National Health Insurance Scheme and by this means industry is guarded against those whose industrial efficiency may be impaired through bad health. Methods of vocational selection are slowly replacing the traditional methods and although no firms in the area have accepted the modern ideas on what should be done, yet many firms have tried to improve these methods of selecting apprentices.

Pre-apprenticeship education is generally taken as an indication of industrialfitness. However several firms give an extra written examination for apprentices desiring entry into drawing offices. This examination is generally of a low standard and is chiefly designed to weed out the worst only of the entrants. Works apprentices are often selected from "learners" who often enter the works before 16 years of age.

ø This is the opinion of several foremen in Tyneside works.

The Juvenile Employment Advisory Committees are often able to place youths in trade apprenticeship but this method of recruitment is now favoured by all employers and is chiefly resorted to for the recruitment of "learners" or unskilled workers.

CLASSIFICATION OF APPRENTICES.

There are several different grades of apprentices which are classified as follows:-

Trade Apprentices are chiefly taken from the Primary Elementary Schools and are trained for the workshops and other manipulative work.

Pupil Apprentices come chiefly from the Secondary Schools and Junior Technical Schools, they are trained in the workshops with a view to becoming overseers or superintendents in the works and very often the most promising are taken into the drawing office, some of course only become skilled workers.

Student Apprentices they have originally been pupil apprentices who have subsequently attended a full time course at a Technical College or University. They are usually drafted to the drawing office and are trained with a view to taking administrative positions in the office.

Research Apprentices these apprentices are taken by firms equipped with a laboratory and are drawn almost entirely from the Universities.

Premium Apprentices these apprentices are given a complete training in every branch of works production, in return for a certain fee which varies considerably. These apprentices are intended for the administrative positions of the management and they are generally drawn from the privileged classes.

THE LEGAL POSITION OF THE APPRENTICE.

When young recruits enter industry they are legally bound in either one or other of two clearly defined groups. All young

recruits to industry are named "Trainees" by the Ministry of Labour and then at the age of 16 years the "Trainee" is classified as either an apprentice or/as a learner to the particular trade followed.

Legal Definition. Apprenticeship is a contractual relation between employer and worker under which the employer is obliged to teach the worker or cause him to be taught any trade or busines and in consideration of such teaching the worker is to serve the employer as an apprentice throughout an agreed period on stated terms" ø

The extent of this training is indicated by two clauses in the agreement which read as follows:* "So far as carried on by the employer" and "so far as the capacity of the apprentice permits". The legal form of written agreement is declining in use and is being taken over by a verbal form of agreement which is recognised as legally binding.

Learnership. The "Learner" is not an apprentice but is engaged by the employer for a recognised period in the capacity of "Learner" and is provided with instruction or with facilities for learning a branch or process of the industry. In this case the employer is not held responsible for the technical training in industry, he is only concerned with the teaching of the learner a few simple processes of immediate economic value. There is no guarantee of continuous employment given during a period of"learnership". The employer is legally obliged to pay an increased rate of wages to the learner since he does not give instruction in trade operations.ø

Upgrading. This is a means by which a labourer who may have commenced his training as a "learner", can be promoted to the rank of a semi-skilled or skilled worker. Promotion is obtained by labourers who have gained an insight of methods and processes in use by working with skilled men. There is no organised system of instruction nor is there any special grade of wages provided for such men. Young recruits to industry

ø "Apprenticeship and training for the skilled occupations of Great Britain and Northern Ireland" General Report V11. 1928.

are tempted to enter as "learners" instead of as apprentices owing to the relatively higher wages offered, this choice is also effected by the personal circumstances of the family. The chief differences between apprenticeship and learnership are set down as follows:-

Apprenticeship

(a) Guaranteed employment for a number of years.
(b) Provision of trade instruction suitable for apprentices to become proficient as journeymen.
(c) Immediate financial sacrifice in order to obtain a better job later.

Learnership.

(a) Higher rate of pay than an apprentice in consideration of lack of training facilities and risk of unemployment.

Methods of Training Apprentices in the Works.

There are two chief methods of training apprentices in the works the first is that of attaching the apprentice to a journeyman to be his assistant and the second is that of training under the direct supervision of the foreman. Almost all of the highly skilled trades prefer the first of these methods as the foremen is generally engaged with his other duties and the supervision of apprentices falls on someone else

The ordinary trade apprentice has little mobility in the workshop system, his training is often confined to the range of work done in the particular section he is employed in or to the scope of work done by the journeyman to whom he is attached.

The pupil apprentice has a better chance of a more general training in the workshops as he will be continuing his technical education in the evenings or in the part time day courses, and the foreman usually recognises his claim to greater workshop mobility in keeping with his more advanced technical knowledge. The pupil and student apprentice are also found in the drawing office. In this case the Heavy Constructional Trades differ from the Engineering Trades in that the apprentices are confined to the drawing offices for constructional work but for engineering the apprentices are

usually given workshop experience before being accepted in the drawing office.

Generally an apprentice has a better chance of getting all round experience in a smaller rather than a larger works. Unless the latter provides special systematised training schemes the apprentice is often forced to spend his time in some water-tight compartment of the works.

The Apprentice Shop Scheme.

Large undertakings sometimes use the apprentice shop as a means for the training of recruits and a special man is engaged as instructor over a large number of apprentices, who are generally employed in some branch of productive work. After a period in this shop they are sent out to assist some journeyman or to work under supervision in some other product department.

Systematised Courses of Instruction.

These are chiefly organised in Government Department or in a few works where a very strict selection of apprentices is made. There are no systematised courses of instruction on the North East Coast, this of course excludes premium apprentices who have a special training arranged for them. These schemes arrange for the apprentices to pass through different departments and to give an all round training, there is usually an arrangement for the apprentices to attend Part-Time Day Classes.

Generally employers are not unreasonably reluctant t embark on ambititious apprenticeship schemes, as they find their apprentices leave them and some other employer reaps the benefit of their training. Unless there is some means of enforcing the training of a limited number of apprentices on all firms, it is difficult to see how any uniformity in methods of training apprentices can be hoped for.

TRAINING BY MEANS OF TECHNICAL INSTRUCTION.

The limitations of the Technical instruction receiv in the workshops is recognised by both employers and workers alike. Most employers shew some interest in the work of the Technical Institutions and encourage their workers to attend

such Institutes by monetary awards, repayment of fees and other means. Those grades of apprentices above the rank of trade apprentice rarely require any prompting to attend evening classes or day classes as they look upon such instruction as essential to a successful career.

The Trade Apprentice has a somewhat different attitude to this instruction, he recognises that he commences his apprenticeship at a disadvantage compared with other apprentices who have had a prolonged general or technical education, and while he is grovelling with elementary principles his contemporaries are covering the special higher technical courses related to the industry.

There are thus two main groups of recruits to industry with different ambitions and different spheres of activity and mobility. This separation is made at the early age of 11 + years, when a selection is made on the result of an examination, those who passed are drafted into Secondary Schools of various types for a prolonged general education or technical education up till the age of 18 or 16 years.respectively. The residue left in the Elementary and Central Schools form the group from which the rank and file of industry are drawn. The trade apprentice has therefore little vertical mobility, his aims in industry are strictly limited by the conditions governing his selection into industry. His chief objective is that of becoming a skilled worker in his trade, leaving the more responsible positions for the higher grades of apprentices.

The educational provision for the rank and file is therefore a separate problem from that of other grades of apprentices. It is to be expected that as trade apprentices will not have any particular ambition to rise to a position of responsibility they will not feel inclined to voluntarily attend Evening Classes. In fairness to them provision for vocational education should be made either before employment commences or during working hours.

Hence there are two kinds of technical instruction demanded, the higher grades of apprentices chiefly require instruction in the mathememtical and scientific principles related to workshop processes, while the trade apprentices and lower grades of apprentices require instruction in the actual use of machines and tool processes.

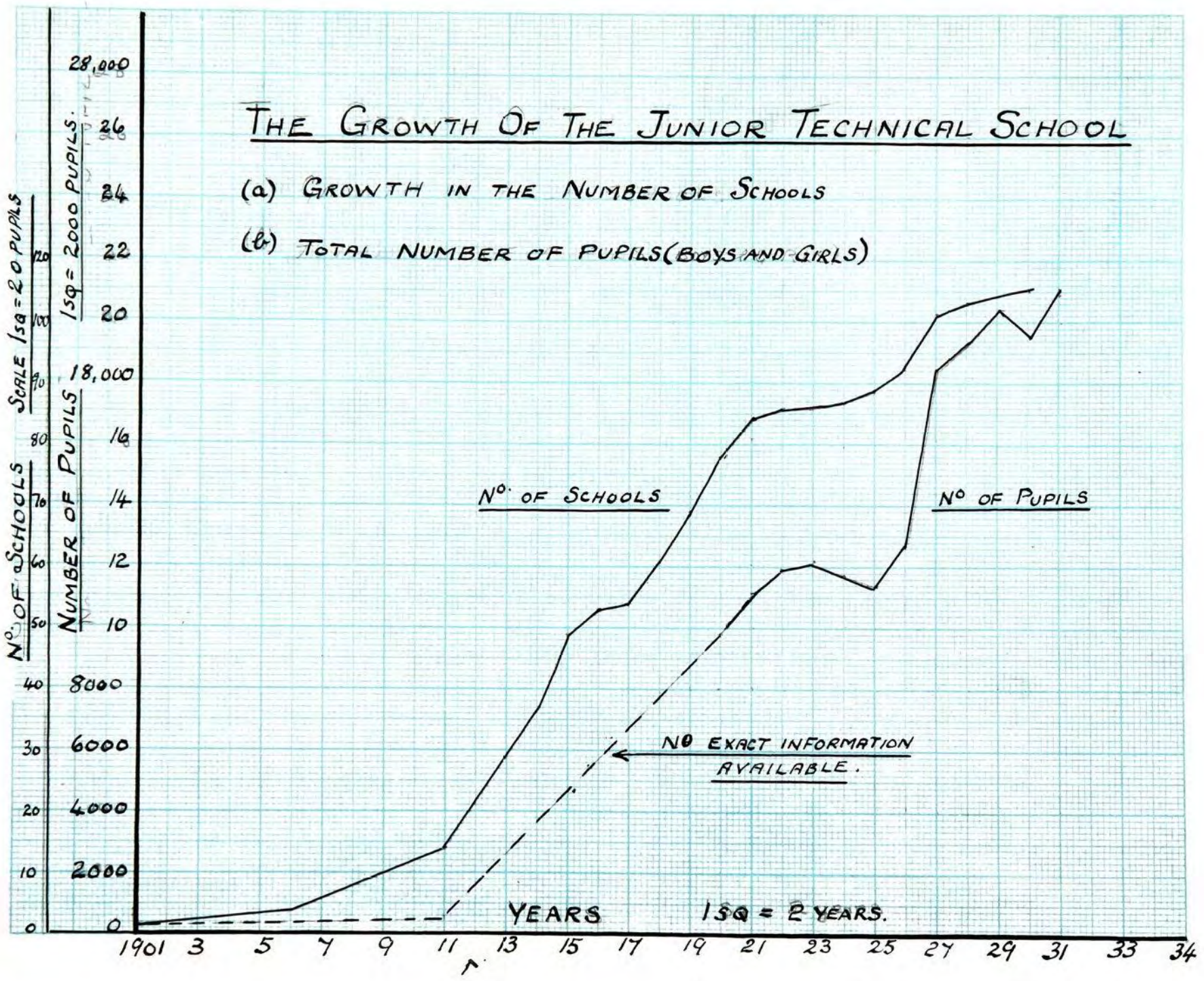
The important advantages to be obtained by technical instruction are recognised by all engaged in industry, it tends to provide an all round training in cases where there is over specialisation in the workshops or offices. Thus technical instruction has become the chief means used by all apprentices to secure vertical mobility in industry, and in some cases it is used to secure adaptability. and therefore horizontal mobility.

Pre-Employment Schools. ß

From the beginning of this century much has been done to introduce technical instruction to bridge the gap which exists between the Elementary School leaving age of 14 years and the age for commencing apprenticeship which is usually 16 years.

This country was far behind European countries in the development of schools which supplied a preliminrary training to the skilled trade, this delay was partly due to the poor educational facilities then existing in this country in comparison with other countries and also to the rapidity of the progress of the Mechanical Revolution. The transition from a system of handcrafts to a "Machine Age" was something new in the world and Britain was facing this change for the first time in history. Other countries followed Britain's progress more slowly and were able to make a deliberate vocational provision to meet the change instead of being overtaken by the change.

In Britian an agitation for technical instruction followed the Great Exhibition of 1851 held in the Crystal Palace, it was clearly realised that the progress of industry depended on the growth of knowledge of scientific principles and the application of this knowledge to artistic design. A Royal Commission on technical education 1882 - 3 stressed the need of more direct applications of science to industry. In 1889 the City and Guilds of London were able to provide direct vocational education having then assistance from the funds of


THE GROWTH OF THE JUNIOR TECHNICAL SCHOOL
(a) GROWTH IN THE NUMBER OF SCHOOLS
(b) TOTAL NUMBER OF PUPILS (BOYS AND GIRLS)
Nº OF SCHOOLS
Nº OF PUPILS
NO EXACT INFORMATION AVAILABLE.
YEARS
1SQ = 2 YEARS.
Nº OF SCHOOLS
SCALE 1SQ = 20 PUPILS
NUMBER OF PUPILS
1SQ = 2000 PUPILS.
1901 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 34
0 10 20 30 40 50 60 70 80 90 100
0 2000 4000 6000 8000 10,000 12 14 16 18,000 20 22 24 26 28,000

the Technical Instruction Act, by means of Organised Science Day Schools which used the buildings of Mechanics Institutes which stood empty during the day. It was thus easy to make use of apparatus which was also used during the evenings.

The Science and Arts Departments merged into the Board of Education in 1900 and by 1902, the Local Education Authorities superseded the old School Boards and Technical Instruction Committees. Under the new ruling the Organised Science Day School developed into Secondary Schools. It was believed that the introduction of Drawing, Woodwork and Metalwork, Cookery etc. would do all that could be properly expected of full time schools.

There were growing protests at the way young people from Elementary Schools were drifing into unskilled and "blind alley" occupations. It was found that the Secondary Schools did not attract pupils who wished to enter the skilled trades and when they left the Elementary School there was a gap of two or three years before they entered industry. In this time they often took a job which led to nowhere in the end.

In 1905 the Board issued regulations for Technical Schools under which aid could be given to Day Technical Classes for suitable students who had completed the Elementary School Course. The result was a revival of the Day Trade or Junior Technical School and during 1905 - 7, 15 Junior Technical Schools were founded in the north of England alone, besides many new ones in London ϕ , where the concentration of opportunities in certain occupations made these schools highly successful. From the beginning there were two distinct types of Junior Technical Schools.

(1) Schools which gave definite instruction for such specific industries as Cabinet making, Boot and Shoemaking, etc.

(2) Schools giving a suitable training for industry but without restriction to any one branch, e.g. Engineering type of Schools.

The Annual Report 1912 of the Board of Education revealed that 111 Institutions with 324 courses were giving Day Technical Classes and by 1913 the Board decided to separate the Junior Technical School from the miscellaneous Day Technical classes, at the same time encouraging them by increased grants, for they had already received the active co-operation of industrial employers.

Junior Technical Schools benefited by the increasing attention being paid to the final stage of education in the Elementary Schools, and by the raising of the school leaving age to 14 years.

The growth of the Junior Technical School from 1901 onwards can be seen from the graph (Statistics in Appendix 5.) Thus after 30 years there are 115 Junior Technical Schools, each having about 250 pupils making a total of 21,066 pupils in England and Wales (boys and girls). The annual output of these schools is about 7,000 pupils and for comparative purposes about one child in every 100 passes through a Junior Technical School.

THE DIMENSIONS OF THE PROBLEM OF APPRENTICE TRAINING IN INDUSTRY.

In 1925 & 6 an exhaustive survey of apprenticeship training for the skilled occupations in Great Britain and Ireland was made by the Ministry of Labour and the statistics and report were published in 1928. The statistics were gathered from many important sources and with a thoroughness and on such a scale that has never been attempted before or since.that time.

The scope of the enquiry covered 44,000 employers, employing about 3,000,000 workers and 137,331 male and 41,530 female apprentices. Employers Associations and Trade Unions gave their assistance, and together with a vast amount of information in the hands of the Ministry this completed the broad bases on which this enquiry was framed. The following extracted statistics revealed the dimensions of the problem of apprenticeship ϕ (From the General Report Vll. See Appendix)

Nos.Male Workers in Gt.Britain in Industry (1925-26)	Nos.Boy .Apprentices.	Nos.Boy Learners.	Nos Trainees (i.e.Apprentices and Learners).
8,291,893	315,000	110,000ϕ	425,000 ϕ

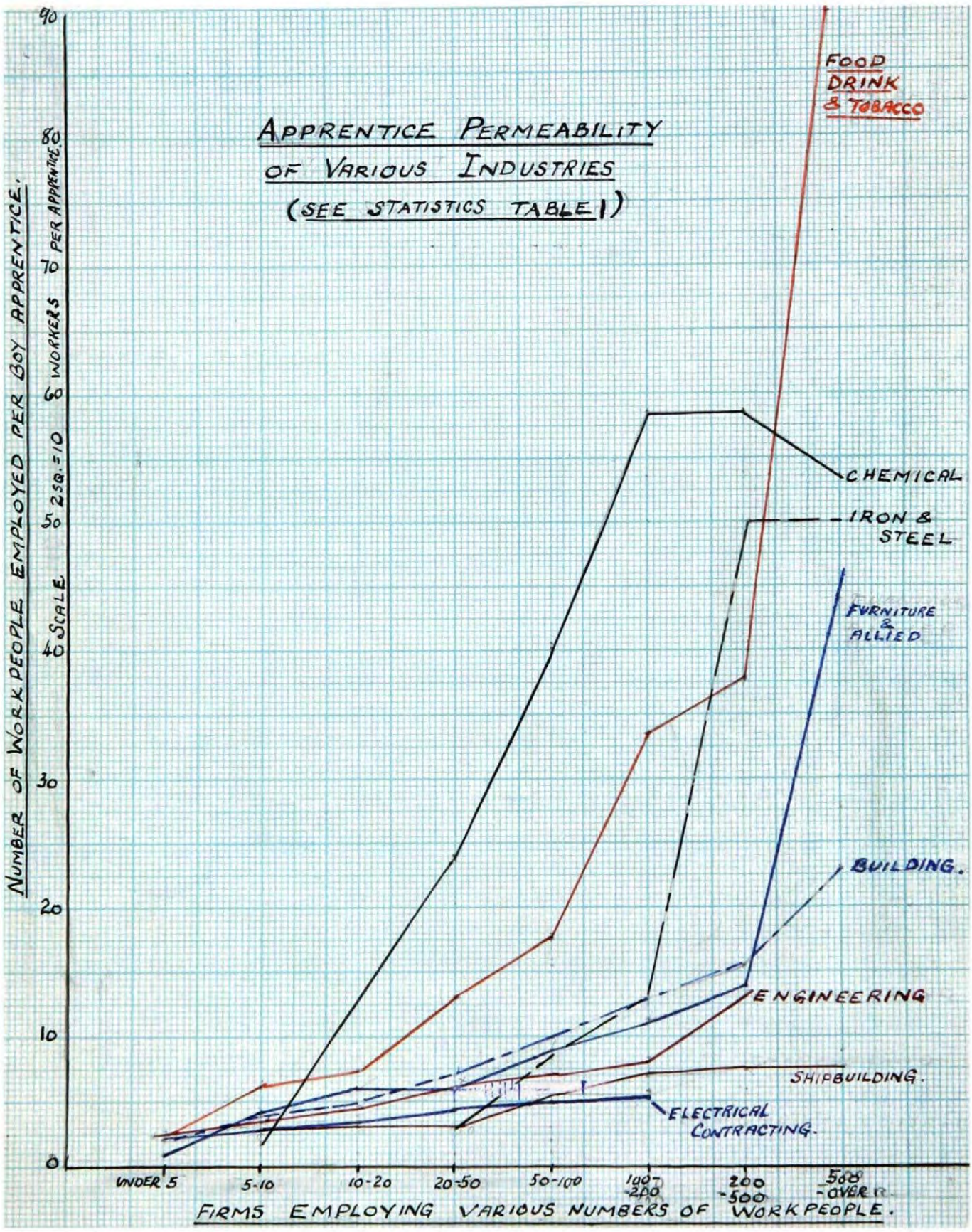
ϕ Excludes learners in the Textile Industry since they are in a different category.

Proportion of Apprentices and Male Workers.

% of Male Workers under 21 years. (in Gt.Britain only)		% of All Male Workers in Gt.Britain Only who are	
Apprentices.	Trainees. (Learners and Apprentices)	Apprentices.	Trainees. (Learners and Apprentices)
19.5%	28.2%	3.8%	5.13% ϕ

ϕ Excludes leanrers in textiles.

The statistics reveal that about 1/5th of the male workers under 21 years are receiving some form of preparatory training for the skilled trades, the bulk of the remainder are in occupations for which lengthly training is not required such as labourers, transport workers, clerks, etc.


APPRENTICE PERMEABILITY
OF VARIOUS INDUSTRIES
(SEE STATISTICS TABLE 1)
NUMBER OF WORK PEOPLE EMPLOYED PER BOY APPRENTICE.
SCALE. 2 SQ. = 10 WORKERS PER APPRENTICE.
0
10
20
30
40
50
60
70
80
90
FOOD DRINK & TOBACCO
CHEMICAL
IRON & STEEL
FURNITURE & ALLIED
BUILDING.
ENGINEERING
SHIPBUILDING.
ELECTRICAL CONTRACTING.
UNDER 5
5-10
10-20
20-50
50-100
100-200
200-500
500 & OVER
FIRMS EMPLOYING VARIOUS NUMBERS OF WORK PEOPLE.

The Distribution of Apprentices in Industry.

The statistics compiled by the Ministry of Labour on this subject for 1925-6 leave no doubt as to the general trend of this distribution; that being, for fewer youths to be trained in proportion to the number of male workers engaged in industry. (See graphs page drawn from statistics in General Report Vll). p.27. See Table 1 Appendix 5.

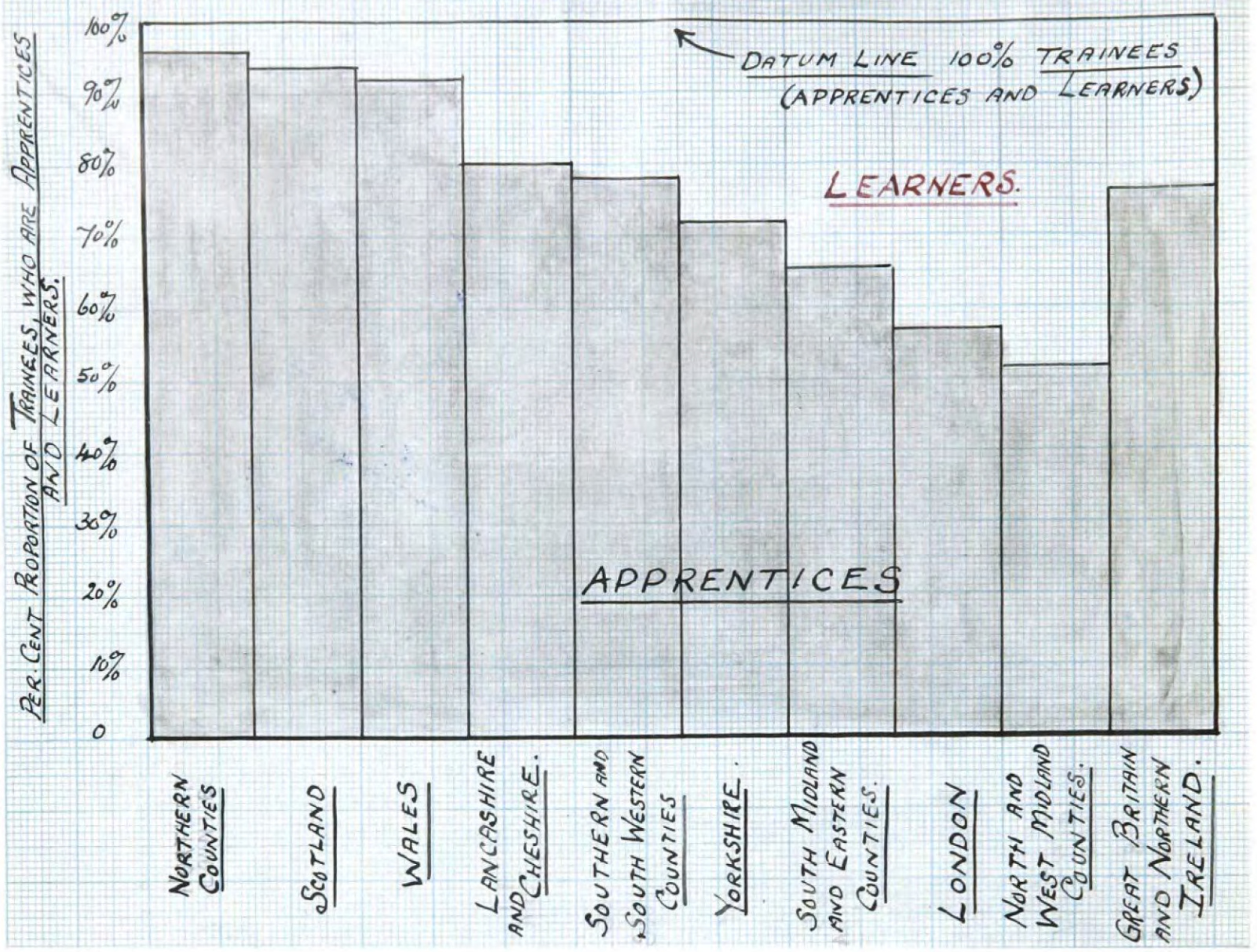
These graphs indicate the "Apprentice Permeability" of some of the main industries, all of these graphs shew how the proportion of the number of workers per apprentice increases as the size of firm increases and this is no doubt due to increasing specialisation and the declining need for apprenticeship in many branches of the trade. The graphical analysis reveals that the Engineering, Shipbuilding, and Electrical Contracting industries are less affected by specialisation than most other industries and therefore a higher proportion of apprentices are required. It is also interesting to compare these older heavy industries with the newer chemical industries where apprenticeship is practically non-existant. Highly skilled chemists are drawn from the Universities, and there is no ordinary system of apprenticeship in this industry; apart from the Research Chemists, the rest of the labour is of the specialised semi skilled type.

There is evidence that the less an industry lends itself to mass production, the greater will be the proportion of apprentices to workers. From statistics ϕ it is possible to group these industries which shew the greatest "apprentice permeability" as follows:- (ϕ See publications by Ministry of Labour in Appendix)

Table extracted from General Report VII p. 23
Table giving "Proportions of Employers taking, and of male work people who are employed as apprentices".

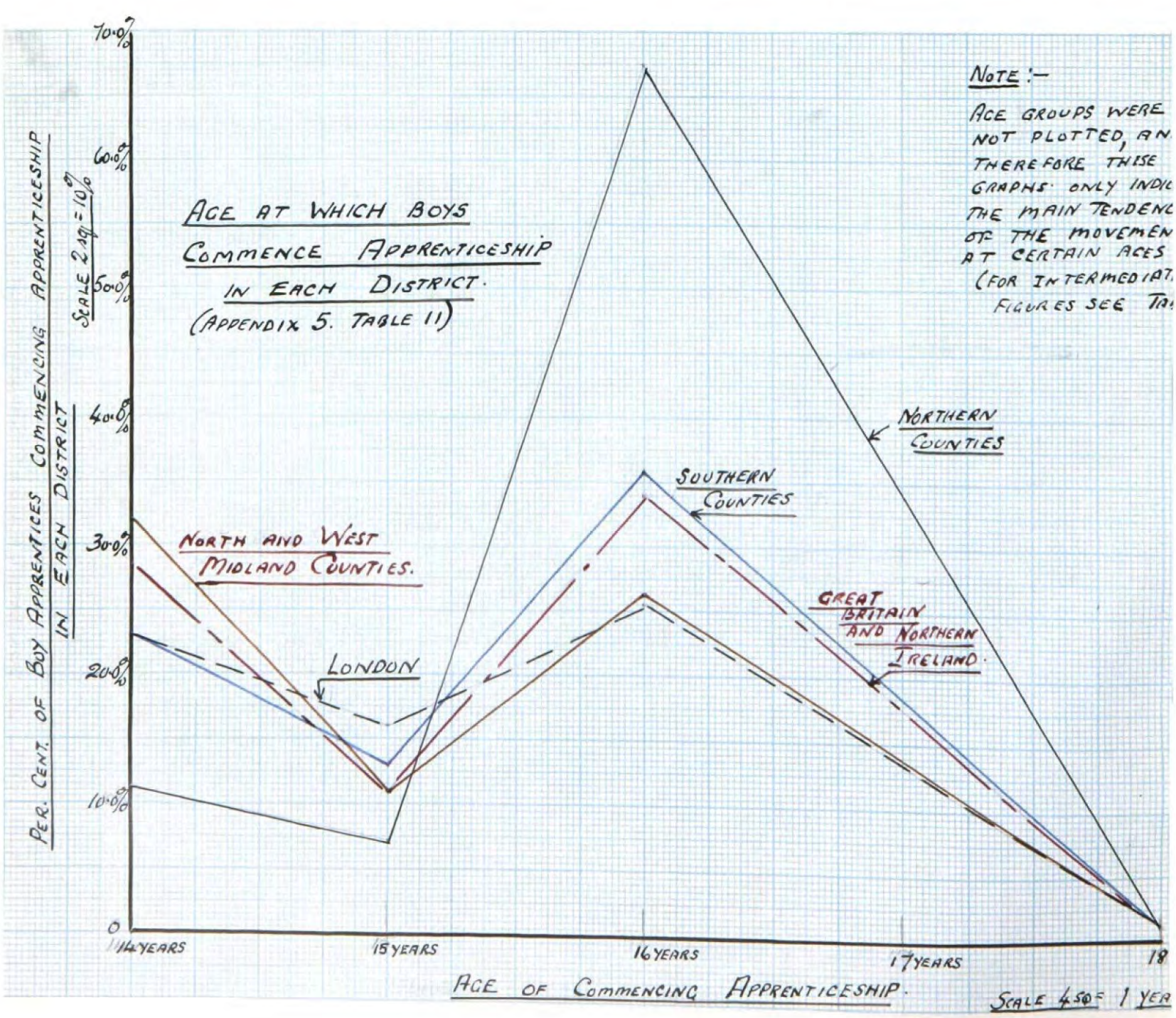
Apprentice Permeability of Various Industries. Industry.	Per cent of total male workers in Gt.Britain and N.Ireland who are apprentices.
Electrical Contracting.	22.4%
Shipbuilding	12.8%
Engineering	7.0%
Building	8.2%
Furniture and Allied Trades	7.3%
Printing	8.9%

PROPORTION OF APPRENTICES AND LEARNERS IN VARIOUS DISTRICTS.



AGE AT WHICH BOYS COMMENCE APPRENTICESHIP IN EACH DISTRICT.
(APPENDIX 5. TABLE II)

NOTE :-
AGE GROUPS WERE NOT PLOTTED, AN THEREFORE THESE GRAPHS ONLY INDIC THE MAIN TENDENC OF THE MOVEMEN AT CERTAIN AGES (FOR INTERMEDIAT FIGURES SEE TA



Industries which do not lend themselves to apprenticeship are as follows:-

Apprentice Permeability of Certain Industries.

Industry.	Percent of total male workers in Gt.Britain and N.Ireland who are Apprentices.
Brick and Tile	0.3%
Iron and Steel	1.6%
Other Metal	2.6%
Chemical	1.1%
Glass and Bottle	3.7%
Paper and Paper Goods	0.8%
Food Drink and Tobacco	3.5%
Distributive	3.5%
Mercantile Marine	3.%
All Textiles and Clothing	1.0% (about)

The Distribution of Apprentices on the North East Coast.

Age of Commencing Apprenticeship.

Statistics obtained by the Ministry on the age of boys commencing apprenticeships in various districts can be diagrammatically represented and compared (see diagrams). It will be seen from the comparison that the North East Coast (NORTHERN COUNTIES TAKEN) area is outstanding in that more Juveniles commence their apprenticeship at 16 years proportionally than in any other area of the country. In all other areas in the country the percentage of learners is heavier than earlier ages than 16 years and this confirms the fact that the industries within the area do not lend themselves to mass production, or to the degree of specialisation found in other parts of the country where semi-skilled labour is more in demand and youths are taken in as learners at 14 years. SEE TABLE II. APPENDIX 5.

Proportion of Apprentices and Learners.

The proportion of apprentices and learners in various parts of the country has an important bearing on the educational provision of the area. The accompanying di agram shews the proportion of Trainees who are either apprentices or learners, and indicates that the North East Coast has the highest percentage of apprentices and the lowest percent of learners of/any other industrial area in Great Britain and N.Ireland. SEE TABLE 9 APPENDIX 5

ϕ The statistics are taken from General Report VII. P. 32
FROM TABLE ON "PROPORTION OF MALE APPRENTICES UNDER WRITTEN OR VERBAL AGREEMENTS AND OF LEARNERS EMPLOYED IN EACH DISTRICT"

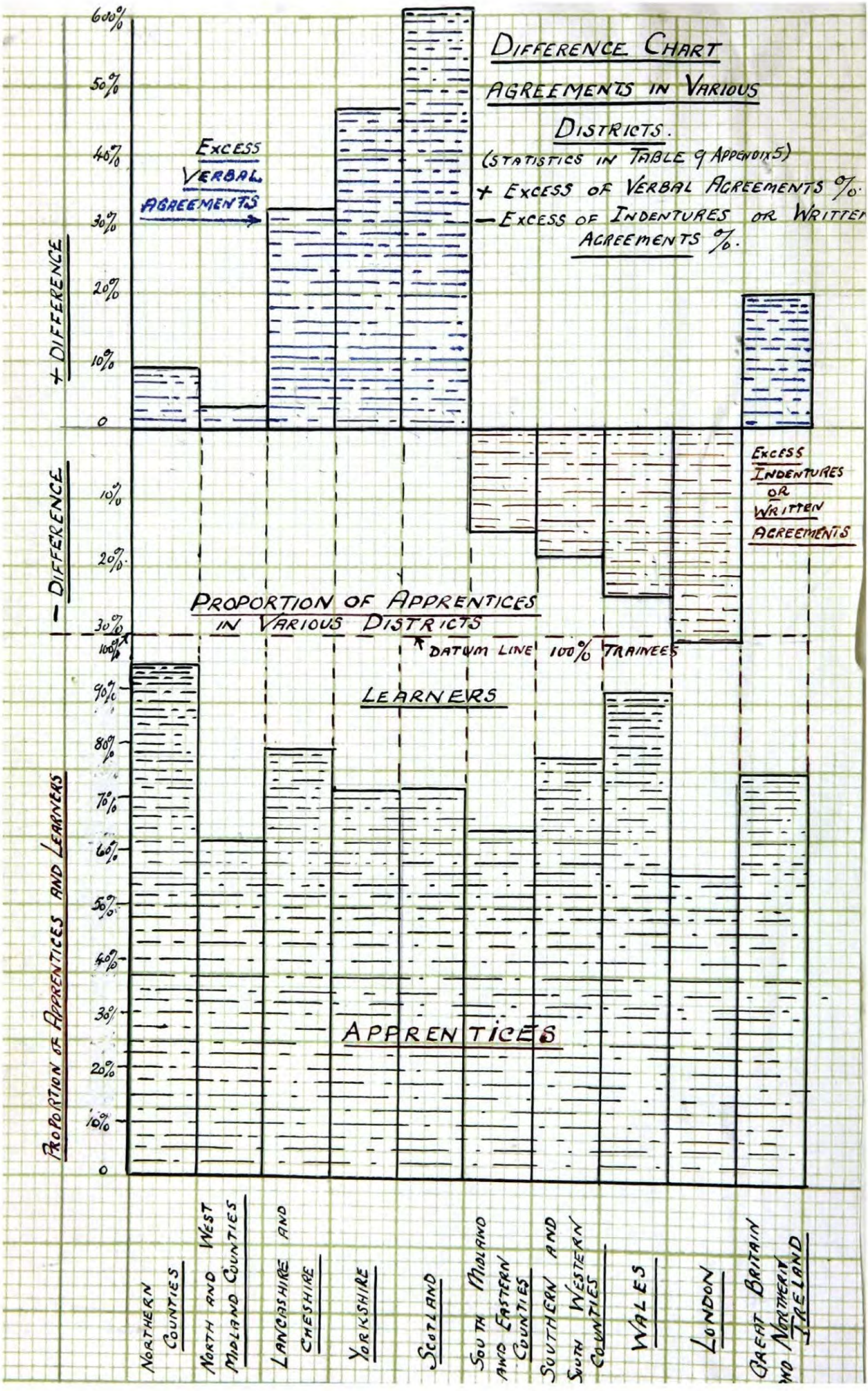
Difference Chart

Agreements in Various Districts.

(Statistics in Table 9 Appendix 5)

\+ Excess of Verbal Agreements %.

− Excess of Indentures or Written Agreements %.



Apprenticeship Agreements.

In the early days of Guild Apprenticeship indentures between employers and apprentices were universal, but when the Factory System commenced and specialisation of labour became common in industry it was no longer possible or even necessary for the employers to fulfil their task of training apprentices in all branches of a craft or business.

The form of the agreement was therefore modified by two clauses already referred to as follows; "so far as carried on by the employer" and "so far as the capacity of the apprentice permits".

Forms of agreement still survive in both the written and verbal form, both are recognised as legally binding. Ministry of Labour statistics giving percentages of written and verbal agreements for various districts in Great Britian and N.Ireland can be plotted on a difference chart (see chart) and this reveals that there is a prominence of verbal agreements.ϕ

If the difference chart is compared with the chart shewing the actual number of apprentices in each district it will be seen that Verbal Agreements are predominant in those districts where the largest numbers of apprentices are found, and these districts are chiefly in the North of England and Scotland. It is therefore difficult to conclude other than that the written forms of agreement are being superseded by verbal agreements, and although both forms are legal, yet in the disinclination of the employer to provide the agreement in writing there is an implied lessening of his responsiblity with regard to the training provided for the apprentice.

In addition the apprentice often shews a disinclination to be bound in any way by written agreements. He often prefers a verbal agreement which he imagines will assist his mobility to transfer to some other occupation should the particular industry he is engaged in become depressed and prospects of regular employment uncertain (see chart).

ϕ SEE TABLE X 5 AND TABLE 9 APPENDIX 5.

The Prospects of Apprenticeship on the North East Coast.

The particular problem of apprenticeship on the North East Coast can now be examined. The preliminary industrial survey of the area revealed that certain industries shewed activity and promise of continued activity in the future, whereas other industries were less favourably situated, a list of these active industries was given on page 18. ,"The Labour Position ", and if these industries are compared with those which afford most scope for apprenticeship, then some guidance can be given to those seeking apprenticeship in the area. A comparative table has been made which indicates the more active industries on the North East Coast atnpresent and gives a Plus or Minus sign to mark the ability of the particular industry to absorb apprentices or not.

The Prospects of Apprenticeship on the North East Coast.

Electrical Engineering	+
Constructional Engineering	+
Motor Vehicles and Cycles	+
Stove Grate Pipe and General Iron Founding	−
Electric Welding and Contracting	+
Minor Metal Trades (Plumbing, Tinsmith and Ironmongery)	−
Building Trades, Materials and Public Works.	+
Furniture Making and Sawmills	+
printing and Paper Mills, Paper Boxes, etc.	−
Food Drink Tobacco	−
Distributive Trades	−
Hotel, Boarding House and Service.	+
Road Transport	−
Glass, Twine, Rope and Other Minor Trades.	−

The prospects of apprenticeship can now be summarized in the four chief divisions of industry on the North East Coast.

The Transmission Industries.

Electrical Transmission together with the Electric Wiring and Contracting Industries offer good scope for apprenticeship, particularly in the Tyneside and Wearside Regions The light Diesel industry offers increasing opportunities especially in the construction of Road Transport Vehicles. Some of the big Motor Garages and Repair Shops offer facilities for learning the motor trade and the prospects of future

employment are fairly secure.

Practically all the other transmission industries connected with Ship Propulsion provide good scope for apprenticeship but the industrial position is such that these industries no longer offer any certainty of employment on the completion of the apprentice ship period and for this reason apprentices now look for openings in other industries. There are numbers of apprentices who use these older transmission industries merely for a technical training to help them to prepare for occupations not necessarily connected with the industry. (i.e. many of the apprentice students at Sunderland do this).

The Heavy Constructional Industries.

The prospects of apprenticeship in these industries are poor, and particularly so in Shipbuilding. These trades are subject to very great fluctuations in the volume of work.

The Tyneside Region is the most important Shipbuilding Centre in the Area, and a certain amount of constructional steel work is also done. The Wearside Region is next in importance to the Tyneside Region for Shipbuilding, but there are no constructional industries in the Region. The Teesside Region is an important centre for constructional steelwork such as Bridges, Derricks, Building Girders, Cranes and other constructional steel work. Shipbuilding is carried out to a lesser degree here than in other regions of the Area.

The Shipbuilding Industry.is in a very depressed condition both nationally and in the area, there are no prospects of continued employment on completion of apprenticeship; even in a good year the volume of work is so uncertain that there is no continuity of work. Although the industry employs a greater proportion of apprentices to adult workers than any other industry in the country except the electrical contracting industry, yet this heavy percentage must be taken as a warning of an industry which is being indirectly subsidized with man power by means of large numbers of apprentices. ϕ (ϕ See graphs of Apprentice Permeability).

The chief reason for the large numbers of apprentices in shipbuilding is that the industry is not mechanised to the extent of most other industries, furthmore it is an industry which does not lend itself to mass production. There are a great number of operations which can only be done by skilled manual labour, and to reduce labour costs a large proportion of apprentices are found necessary, which are regarded as a menace to the security of the journeyman workers or in the industry.

Much could be done to improve the continuity of shipyard working conditions, Shipbuilding is rigidly sub-divided into many trades such as Shipwrights, Plumbers, Joiners, Caulkers and Riveters, etc., and each trade jealously guards the

demarcation of the work to be shared out. This trade jealously no doubt owes it origin to the assertion of the possessive instinct of the worker for his craft or job, and this has through time been fixed by Trade Union regulations. This problem was referred to at the Joint Enquiry of the Shipbuilders Federation and the Trade Unions in 1926 as follows:-

Extract. "The introduction of subdivision of labour in British Shipyards has led to methods and practices which have prevented interchangeability and we believe it is possible to secure greater elasticity and interchangeability without infringement of the broad principles of craftsmenship"

Shipyard apprenticeship is now almost exclusively confined to apprenticeship within a particular subdivision of the trade, and on completion of apprenticeship the journeyman can only work within the narrow limits laid down by the Trade Unions. The Drawing Offices offer better scope for a broad training, yet there is a tendency to employ large numbers of apprentices under a chargehand who is/occupied with his other responsibilities that the youth is left to pick his own way. Until a few years ago the Drawing Office staff were regarded as a permanent staff to be maintained irrespective of trade fluctuations, now however, it is usual to regard Journeymen Draughtsmen as casual labourers; to be hired when new work is being chartered and then to be unemployed for long periods.

The evidence would suggest that there is a considerable surplus of skilled shipyard workers and further that the large proportion of apprentices employed tend to make this a chronic state of affairs. For these reasons the shipbuilding industry is not to be recommended as a good opening for apprentices ϕ (ϕ These observations on the shipbuilding industry have been made by the writer after many years of experience in the industry).

Sx The Stove, Grate, Pipe and General Ironfounding Industries.

These industries are active at present and are likely to maintain their activity for some time to come, but they do not offer good scope for apprenticeship as only a low percentage of apprentices are employed.

The great majority of boys entering these industries do so as learners and there is no systematic provision for training apprentices, the system of indenturing boys is almost extinct in these industries and great difficulty is met with in keeping apprentices for their full period of five years training prior to becoming skilled workers in either the moulding or core making branches of the trade.

A report on "Education in Relation to Foundrywork" was published by the Board of Education in 1924 and the following extract is taken from Para.6 page 7, on "Factors Adverse to Recruitment":-

Extract.

"In spite of the slightly higher pay accorded to foundryworkers there is considerably less competition to enter this work than is the case in other branches of the Engineering and Allied Industry. There is no doubt this is due to the dirty nature of the work and the uncongenial conditions in which it is frequently carried out, but it is also due to the limited possiblities of advancement in the occupation, and to the lack of systematic schemes of instruction leading to higher posts. The number of higher posts available in foundry work is small compared with those available in other branches of Engineering work, where a boy can feel that no position is absolutely beyond his reach should he possess the necessary ability. In the North of England it is found impossible to bind apprentices as the boys can obtain higher wages in mines or shipyards".

The Electric Welding Trade.is rapidly developing and is likely to become an exceedingly important sub division of the heavy constructi nal industries. In the shipyards some trouble is being experienced owing to the replacement of Riveters by Welders, At present there is a deadlock between the Employers and Trade Unions since the Employers desire a new class of workers to be recruited for Welding while the Trade Unions demand that Riveters shall be allowed to take over the Electric Welding job in the Engineering trades.

Electric Welding is an highly skilled job and it is significant that the preliminary training of apprentices for this work is being done in Technical Colleges and Evening Institutes, there are plenty of good openings both in Shipbuilding, Constructional Steelwork and Allied Engineering Industries. There is also scope for private contracting work.

THE MINOR INDUSTRIES.

The Building and Allied trades offer good scope for apprenticeship and there is a fair amount of activity in these trades, and likely to be in the future. These trades are not yet organized in large units as are the older industries, and it is possible for any apprentice with the necessary ability to become a Building Contractor himself.

The vertical mobility possible in the Building industry is now attracting a better type of recruit than is usually attracted to the heavy constructional industries where sub-division and specialisation prevent the vertical mobility of labour. Building apprentices find it easier to obtain all round works experience than/apparentices in any of the heavy industries.

The Furniture Making Industry.

This industry is rapidly growing on the North East coast and there is much activity in both the Wearside and Tyneside Regions. At present the industry is organised in relatively small units, there is no recognised apprenticeship training given in the works, and machinery has replaced skilled manual labour in such operations as planing, sawing, joint making, sandpapering and grooving, etc. A large number of apprentices are employed on unskilled work, yet there is scope for boys who have had some preliminary technical training in cabinet making and who voluntarily continue their further education in Evening Institutes, they can rise to positions of a supervisory nature in the workshops or as Furniture designers in the drawing offices. Many of the best openings in this industry occur on the commercial side of the business as salesmen, these positions often lead to a managership.ϕ

ϕ At Sunderland several Junior Technical Schoolboys have made a very successful careers as furniture salesmen.

The Timber Industry.

The North East Coast is an important timber importing centre, the timber is largely used for the mines and shipyards and to a less extent for the building and furniture industries. The chief centres of this industry are in the Teesside, Wearside and Tyneside Regions, at Hartlepool, Sunderland and on the lower reaches of the Tyne resprctively. Sawmilling is done in connection with the industry, but there is very little scope for

training in any of these industries. The more attractive positions are found in the offices dealing with quantities.

The Minor Metal Trades.

Such trades as Plumbing, Tinsmithing, and Ironmongery do not offer much scope for apprenticeship in the area, although these trades are at present shewing activity. Of these trades Plumbing shews the most scope for apprenticeship, as the trade is organised in a small way and vertical mobility is possible.

Heating and Ventilating Engineering.

These trades offer a limited number of good openings, but few apprentices are required, the firms are usually small but have extensive connections, and the work demands continual moving about and on this account is objectionable. However it is a trade in which there are possibilities of early responsibility leaning to supervisory positions, and there is nothing to stop a capable boy from becoming his own master.

The Tinning Trade.

The tinning trade is poorly represented in the area and is chiefly centred in the Tyneside Region, the industry is almost completely mechanised and the workers required do not need a prolonged training but rather a certain amount of adaptability.

The Printing, Papermaking and Paperbox Industries.

Printing offers good scope for a limited number of apprentices, the industry in the area is composed of many small firms whose further expansion is problematical owing to the isolation of the area. The Papermaking and Paper Box Making industries are very poor openings for youths owing to the large proportion of unskilled labour employed and the specialised nature of the work. The work is sometimes done by women. There are occasional openings in works laboratories attached to the paper mills, which offer a chance to a youth prepared to study in the evenings.

The Foods, Drink and Tobacco Trade. is active at present and shews good signs of further activities, but the industry is not suitable for apprenticeship and no definite training is required. This industry is liable to be invaded by women and for this reason it is not a good opening for young men who would expect a higher rate of remuneration.

The Distributive Trades.

These trades are active and are more or less secure from the fluctuations of the heavy industries, but as they do not require any special training they are poor openings for apprentices; indeed apprenticeship is practically unknown but there is a system of learnership which is chiefly used as a means of obtaining cheap labour. These trades are being rapidly being taken over by women employees at lower wages than offered to men.

Miscellaneous Industries.

Road transport offers practically no scope for apprenticeship, a form of learnership is now the recognised method of training for such positions as drivers, etc. Many apprentice engineers from the heavy industries have found positions in the transport industry as drivers and repair mechanics in garages, there is still plenty of scope for an engineer wishing to set up in business of his own.

The Rope and Twine industry is almost ent rely operated by unskilled workers.

The Glass industry is largely recruited from unskilled operatives although a limited number of skilled men are required. The laboratories usually take their apprentices from the Junior Technical Schools.

The Hotel, Boarding House, and Domestic Service trades are shewing renewed activity in the area and there are good

prospects in this trade for women. Young men are also being recruited as waiters and stewards on ships.

THE DEPRESSED INDUSTRIES.

Apprenticeship is often well catered for in industries which are suffering from economic troubles, but unless a youth can be assured of a job and reasonable prospects on completion of his apprenticeship then it is of no use recommending such industries to the young recruit about to enter industry. The Heavy Engineering Industries and the Shipbuilding Industry are examples of industries where the apprenticeship system is well developed but the heavy incidents of unemployment in both of these industries has done much to turn the best type of recruit away from them.

The older Transmission Industries have more complete arrangements made for technical instruction in Day and Evening Institutes than most of the newer industries, and there are still numbers of apprentices who enter such industries only to make use of their excellent training facilities and with no intention of entering the industries themselves.

The Coal Mining Industry.

Apart from Premium Apprentices there are no ordinary apprentices in the Coal Mines, a system of learnership provides the necessary training for the various labour groups. Apprentices are employed however in the Electrical, Engine, and Repair shops, etc. attached to the Mine, the Mine Surveyor's office is also a recognised department for taking apprentices.

The modern tendency in the coal mine is for all work at present done by manual labour to be done by machines, this growing mechanisation will rapidly demand workers trained for the manipulation and care of these machines. It is possible that a new type of recruit will be brought into the mines by this increasing mechanisation. Already courses of Mining Instruction have been arranged to cater for the growing interest of the workers in every day mining problems. There appears to be scope for youths with some knowledge of the handling of machines in mines ϕ

ϕ See "Existing Facilities for Technical Education". Chap.

The Merchant Shipping Service.

This Service was once a very attractive career for a youth but now the depressed condition of the shipping services, together with the uncertainty of employment on completion of a long period of training, have removed the attractiveness of this job. The Engineers go to sea after serving their apprenticeship in a shore establishment; they then serve three years at sea before they are qualified to sit their final ticket. The Navigating Officers serve their apprenticeship at sea and have certain tickets to pass before they are qualified to take command of a ship.

There are serious complaints at the way in which the position of these officer apprentices has been abused. They are often used as cheap labour on board ship, and very frequently the are not afforded the proper facilities for studying their subject. Owing to the contraction of the British Shipping services there is a large surplus of fully qualified engineer and navigating officers, consequently those with jobs dare not risk having shore leave either for a holiday or for examination purposes, in case their places are taken. The sea-going engineers are sometimes able to take up engineering jobs ashore and they are therefore in a somewhat better position than the navigation officers.

THE CHANGED EDUCATIONAL REQUIREMENTS OF APPRENTICESHIP.

When the Mechanical Revolution was experienced in this country in the 19th Century no deliberate provision was made for Technical Education outside the works. As a compromise the old system of craft apprenticeship was introduced into the newly formed engineering industry, and this satisfied the immediate demand for skilled workers.

During the latter half of the 19th century, technical instruction was provided to an increasing extent outside of the industrial system; chiefly in Evening Institutes, and by the end of the 19th century apprentices were entirely dependent on the Evening Institutes and Technical Colleges for their theoretical knowledge of industrial processes.

Previous to the War industry was becoming increasingly specialised and sub-divided into "watertight departments", it became impossible for a man to change from one sub- divided trade to another owing to Trade Union regulations. Apprenticeship was generally restricted to experience in a particular department of a works or in the doing of a particular operation.

The Great War brought about a complete breakdown of the apprenticeship system, and during this time industry was specialised and sub-divided to an extent hitherto unknown, in an attempt to increase production with the minimum of skilled adult workers. After the War the Ministry of Labour formulated the Interrupted Apprenticeship Scheme to provide industrial training for ex-Service men whose apprenticeship had been interrupted by War service, this was only a temporary measure and it only delayed the revelation of the true position of apprenticeship training.

In 1918 the Board of Trade published a"Report on the Engineering Trades after the War", and drew attention to the serious position of apprentice training. The growing concern felt by the skilled trades as to the training of apprentices was afterwards investigated by the Ministry of Labour in 1925-6, and a comprehensive report was published in 1928 on "Apprenticeship Training". This report revealed that only 1/5th of the male workers under 21 years were receiving some form of training for the skilled trades.

The decline in apprentice training was largely attributed to the changed conditions in industry, in which specialisation of production and sub-division into watertight departments; each having its own Trade Union Regulations, militated against interchangeability of labour and therefore ade a broad apprentice training useless as it could never be used by the worker in any other department except that in which he had started.

The effect of this stagnation during apprenticeship has been to almost annihilate the ambition of youths seeking a career in industry, consequently almost all of the better type of apprentices particularly in the engineering industry have come to regard workshop experience as a preparation for some other job and not as a training for the industry itself. The technical provision for these apprentices must therefore not be narrowly concerned with particular industries, but it should equip them for careers which use such industries as a means of technical instruction.

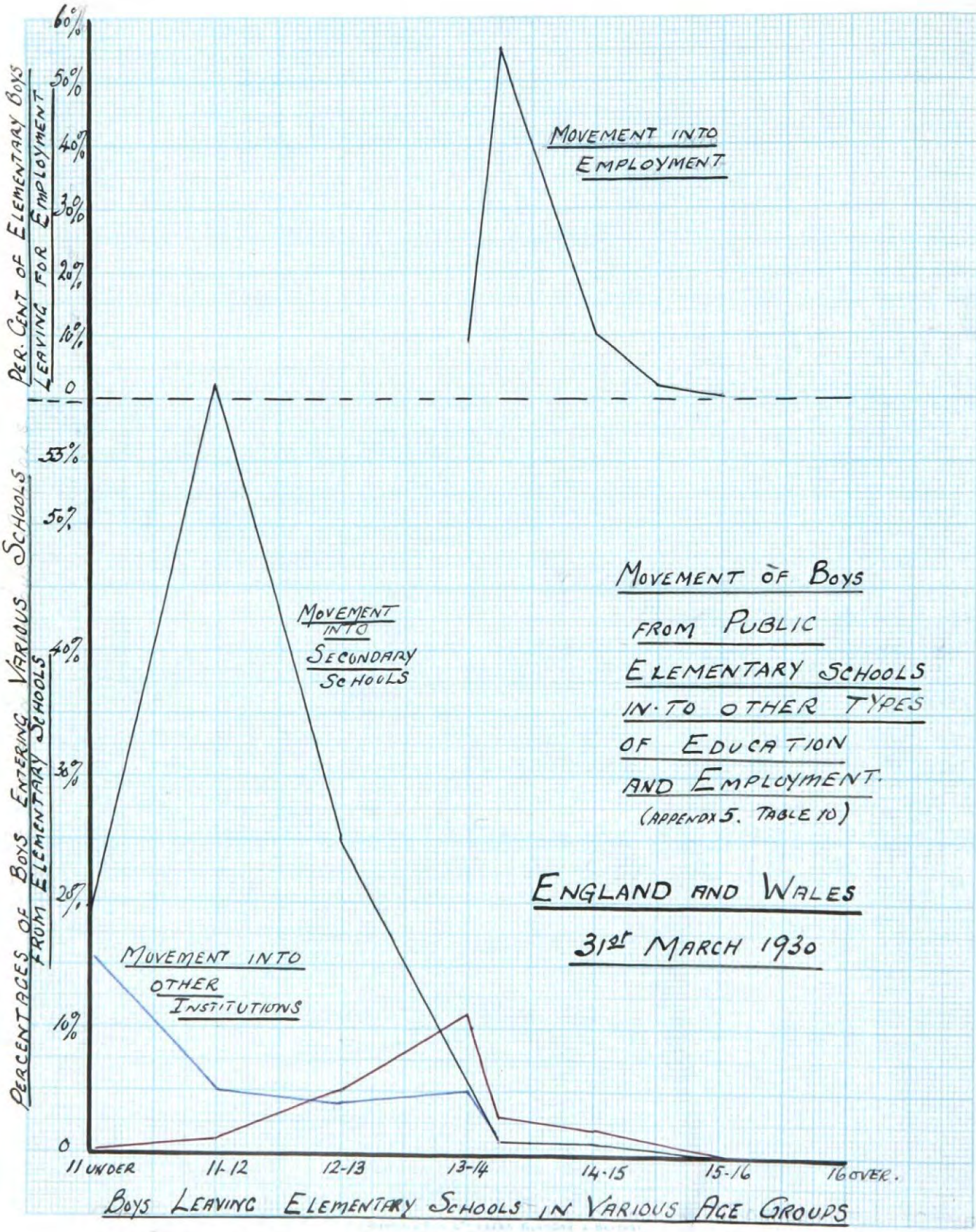
In certain industries (e.g.Building Industry) where there is a reasonable chance of good apprenticeship and prospect of rising to important positions within the industry itself, the provision of technical education should be more directly related to the industry and less regard paid to other possibilities.

Technical changes in industry now occur with much greater frequency than at any other time since the Mechanical Revolution began. When the present modern industries were being organised in the 19th century the various sub-divisions were

grafted with the old Guild traditions and regulations, and interchangeability of labour became impossible. Many of these original trade sub-divisions have been made obsolete by recent technical advances; yet Trade Union regulations prevent workers in these obsolete branches from seeking work in other trades. The technological unemployment thus caused was likely to be permanent if the present regulations continue to exist, and the risk of technological unempliyment in adult life is bound to adversely affect the recruitment of good class apprentices especially in those industries which are sub-divided to a great exent, e.g. such as Shipbuilding.

Adult vocational training schemes have been organised by the Ministry of Labour to deal with this problem of technological unemployment. Although these schemes are excellent yet Trade Unionregulations prevent interchangeability and therefore the men so trained are unable to get placed, the Ministry have been compelled to make these schemes voluntary instead of compulsory.

It is evident that no progress can be made in the tackling of technological unemployment until there is complete interchangeability between all branches of industry. When this is done adult training schemes, and special subject courses now available at many Technical Colleges will provide the machinery to assist displaced workers to re-adjust themselves to new conditions in industry.


Movement into Employment
Movement into Secondary Schools
Movement into other Institutions
Movement of Boys from Public Elementary Schools in to other Types of Education and Employment.
(Appendix 5. Table 10)
England and Wales
31st March 1930
Boys Leaving Elementary Schools in Various Age Groups
Per. Cent of Elementary Boys leaving for Employment
Percentages of Boys entering various Schools from Elementary Schools
60%
50%
40%
30%
20%
10%
0
35%
30%
25%
20%
15%
10%
5%
0
11 under
11-12
12-13
13-14
14-15
15-16
16 over.

SCHOOL AND EMPLOYMENT.

Introductory.

The Dimensions of the Problem of Education between 11 & 16 Years.

The Board of Education report for 1930 provides statistics of the movement of boys from Public Elementary Schools into other schools and other places. (see statistics TABLE 10) Some of these statistics have been graphically represented and from the graphs it will be seen that most of the Secondary School students move from the Elementary Schools between 11 - 12 years, but the Junior Technical School Students do not move until between 12 - 13 years. It is also important to note that the bulk of the residue left in the Elementary Schools move out for employment between 14 years - 3 months.

The total percentages of boys in all age groups leaving Elementary Schools in England and Wales during 1930 for further education, employment, etc. are as follows:-

Secondary Schools.	11.5%
Junior Technical Schools.ø	2.3%
Other Full-Time Institutions.	3.0%
Employment.	77.9%
Other Reasons.	5.3%
All Reasons.	100.0%

ø This includes Junior Art Schools and Nautical Schools.

The actual numbers of pupils in Elementary, Secondary and J.T.S.Schools have been extracted from the "Statistical Abstract" for the period 1930 - 31, and have been arranged as follows:-

Public Education for England and Wales 1930-31.

Type of School.	Males.	Females.	Total. Ages.	
Elementary Schools.	2,799,674.	2,720,692	5,520,366.	All Ages.
Secondary School.	221,064	195,900	416,964	" "
Junior Technical Sch.	14,913	6,153	21,066	" "

ø J.T.S.Includes Junior Art, Housewifery and Nautical Schools.
(See Tables 37, 41 and 43, Statistical Abstract 1930-31.

It will be seen from this analysis that the Junior Technical School forms a very small part of the educational system. Proportionally to those in Elementary Schools there are only 0.38% in J.T.S.Schools and 7.5% in Secondary Schools.

The "Statistical Abstract" 1930-31 also provides some important information having a direct bearing on the problem of Jumenile Employment; and reveals that in 1930 there were 454,262 Juveniles who left school for employment on becoming exempt from school attendance in Elementary Schools. In 1931 the number of 472,175. (Table 37 Part 2 Statistical Abstract 1931.) A full investigation will now follow on the Recruitment to Industry from various types of schools.

RECRUITMENT TO INDUSTRY FROM ELEMENTARY SCHOOLS.

Exact information regarding the occupations taken up by ex-Elementary School boys is not to be obtained at present, as the Elementary Schools do not collect such information.

However the Ministry of Labour hasalready collected much information on the problem of Juvenile Unemployment and on other industrial recruitment problems and the newly formed Juvenile Employment Advisory Council have taken up the job of collecting statistics of occupations taken up by leavers from various types of schools.

In 1928 the Ministr of Labour published a "Report on the Personal Circumstances and Industrial History of 9748 Claimants to Unemployed Benefitx". This number of claimants represented 1 out of 100 on the live unemployed register, and this information has been proved to be a reliable indication of the whole field taken except where the numbers are small in any category.

Aconsideration of statistics in this report revealed that for unemployed of all ages under 30 years 94.5% left school before turning 15 years and only 5.5% left school after 15 years.

Age groups of unemployed on leaving school up to 30 years of age.

All Ages Under 30 Years.	Before Turning 15		After Turning 15	
	1924	1927	1924	1927
-6	93.9%	94.5%	6.1%	5.5%

It is thus clear that a very high percentage of recruits to industry complete their full time schooling before the age of

15 years, and as they cannot commence apprenticeship in any of the skilled trades until 16 years of age, a certain "gap" exists which often leads young recruits to take up any sort of temporary employment with the result that they unwittingly jeopardise their future earning capacity.

There are other factors which must be considered when reviewing the recruitment of Elementary School boys and they are the effects of the changed educational grouping at 11+ years which followed the recommendations of the "Hadow Report" in 1926. ø (The Education of the Adolescent).

Since the beginning of this century there has been a selection by examination of the abler children in the Elementary schools and these have been transferred to Secondary schools. A much smaller proportion are also transferred at the age of 12+ or 13+ to Junior Technical Schools; and recently a further selection of children at 11+ are transferred to Central Schools and Senior Schools which are part of the Elementary system.

øz. "Report on Personal Circumstances and Industrial History of 9748 claimants to Unemployed Benefit".

A comprehensive explanation of the nomenclature and different types of Elementary and Post Primary schools has been included in the Memoranda so that no further explanation of the aims of each type is required here. (See Appendix 2.)

The net effect of all these changes has been to move upwards the leaving age of the pick of children of the Elementary School system so that they are not available for employment until after 15½ years for Central and Junior Technical Schools and between 16 - 18 years for Secondary Schools.

The remainder of leavers at the statutory age of 14 are therefore on the average somewhat inferior in intellectual ability; and as already indicated it is only the poorest of this residu who are attracted to the heavy industries such as Shipbuilding and Engineering when such industries are depressed. In the last century the recruits to industry were almost entirely taken from the Elementary Schools but with the changed conditions of industry and educational provision it will be essential for all industrial concerns to differentiate recruitment according to types of schools and the particular grade of employment offered.

Statistics of Juvenile Unemployment issued by the Ministry of Labour for 1928 ø suggest that Ex-Elementary School boys are more liable to Juvenile unemployment than Ex-Secondary boys as 94.3% of unemployed Juveniles were Ex-Elementary and only 5.7% were Ex-Sedondary. ø See Statistcis in Appendix 5). TABLE 7

The proposed raising of the school age in 1930 was accompanied by some misgiving that there would be a shortage of Juvenile labour and a "Memorandum" was prepared by the Ministry of labour based on the views of Local Juvenile Employment Committees and issued in 1929. ø See BIBLIOGRAPHY.

The report considered the effect of the decrease on numbers of available Juveniles between the years 1927 - 33, owing to the reduced war time birth rate and found that although nationally there would be decreases ranging between 15 - 30% yet in some areas there would actually be increases owing to concentrations of armament workers during the war. On the North East Coast the

reduced war time birth rate was very slight as this was an area where the armament and basic industries demanded male labour during the war years. The effect of the reduced supply of Juveniles was never experienced owing to the great depression in industry which coincided with this period 1927-1933. As there is an excess amount of Juvenile unemployment in this area the raising of the school age would be welcomed by almost everyone, and it would probably make most of the Juvenile Instruction Centres unnecessary.

The immediate effect of such a step would be to improve the selection of trainees to the Heavy Industries in the area; as the youths would be of the right age for apprenticeship on leaving and they would have a better choice of employment.

Recruitment to Industry from Central Schools.

The Central School has made very rapid progress since the War and its development has overshadowed that of other branches of the scholastic system. In London alone during 10 years following the war 28 Central Schools were built and only one Secondary School

Central Schools provide education for students between 11+ years and 15, although the students can leave at 14 years if they wish. Some of these methods are Selective and othere are Non-Selective. The Non-Selective are usually found in country districts and the Selective Central Schools in towns, or where there is a Senior School to take the residue of the Elementary Schools at 11+ ø. (ø See Appendix 2.) It is sufficient to indicate here that after two years of general education in its broadest sense the students are grouped into Technical, Commercial and Domestic Departments (for Girls), arranged for them in the same school.

On leaving for employment the leavers from both Elementary and Central Schools attend Continuation Schools usually held in the evening up to about 18 years of age. On passing examinations at the end of each session the student is eventually promoted into Higher Education Classes which are usually held in Technical Institutes, whereas students from

Secondary or Junior Technical Schools pass straight into the Higher Educational classes. Many of the Central Schools cover two thirds of the ground of the Junior Continuation Evening Schools and advise their students to sit for exemption from certain of the Continuation School Examinations. The Central School student is therefore under no handicap as regards the Continuation Schools and allowances are usually made which compensate for the extra time spent at school.

Most of the Central Schools take a Modern Language and any students shewing exceptional ability are specially prepared for the School Certificate Examination. There is thus ample provision made for all types of ability and no real hardship to any.

These schools are not vocational but use vocational subjects as an education medium through which to vivify the interests of the children; the "atmosphere" usually found in these schools directly preparing for industry is lacking in the Central School. There are many reasons why the Central School has not developed either the essential characteristics of the Junior Technical School or the Secondary School. The chief reasons are the lack of a definite aim, the great difficulty in providing a general education to one group of children in the school, and a specialised preparation for a particular occupation to others which will command the confidence of employers; and also the staff of the Central School does not include that proportion of well trained engineers found in Junior Technical Schools.

There is no doubt that the level of attainment of Juveniles now leaving all types of Elementary Schools has been raised by the more careful provision of education after 11+ years. The Central Schools are turning out adaptable types of recruits suitable for apprenticeship in either industrial trades or commerce, at ages just right for apprenticeship and consequently they have a better choice of employment. The are able to enter industry without any "inferiority complex" which usually upsets the Average Elementary Schoolboy who leave school

at 14 years.

There are reasons for believing that the Central School is slightly in advance of the times and that its true educational value will not be recognised until "Interchangeabilit becomes possible in industry. When this occurs the worker will be able to change his trade in industry either to avoid "technological unemployment" or for personal reasons. Adaptability will then become of great importance to workers in these trades which are largely mechanised, and this will no doubt justify the general lines of advance of the Central School.

The following extract on "Senior Elementary Schools" is taken from a Board of Education Report on "Trade Schools on the Continent"(1932) Chap.Vll, p.105. The type of school referred to in cludes both the Central and Senior Schools.

Extract.

Senior Elementary Schools.

"No foreseeable increase in the number of trade schools and Junior Technical Schools, could, or indeed should, be regarded as meeting the whole problem of pre-employment training for the rank and file. Industrial processes are in the melting pot, and the manual scale is constantly being displaced by the introduction of new mechanical operations, with the result that there is a large demand for recruits who are not expected to have a specialised scale and for whom the training in the Junior Technical Schools, or in the Trade Schools would be inappropriate. What these young people require is adaptability and resource; they should be "handy men", capable of turning their attention to new tasks and new problems, and making a success of them. If they really are adaptable, transfer to unaccustomed work will have no terrors to them; it will rather excite their interests and give them the mastery which overcomes difficulties".

RECRUITMENT TO INDUSTRY FROM THE JUNIOR TECHNICAL SCHOOL.

The Historical evolution of the Junior Technical School has already been outlined in a previous chapter on "The Recruitment of Apprentices to Industry" (see page 32) (Pre-employment Schools). These schools occupy a relatively small position in the educational system, about 7,000 boys and girls leave these schools each year while the output related to the Engineering Industry is about 2,000 ø (Education for the Engineering Industry 1931 Board Education) Appendix 1V. B.111. p.43.)

In 1930 there were 115 Junior Technical Schools with ~~19,000~~ 19,537 pupils (boys and girls) and some idea of the widely varying curricula of these schools may be obtained from an anlysis of the vocational courses given at these schools. ø

ø "Education in 1930" - B.Education Handbook.)

Courses.	Number of Boys.
1. Constructive Trades (General)	6,648
2. Engineering	4,258
3. Commercial	1,728
4. Building, etc.....	779
	13,433.
5. Miscellaneous Courses	793
Total Number of Boys	14,226.

It is interesting to note that 11,705 boys or 82.5% of the total number are entering three main groups of courses for Constructive Trades, Building and Engineering. These schools tend to a well known type quite distinct from Trade Schools. The Engineering type in particular is generally found at its best in the provinces and particularly on the North East Coast, where the heavy engineering industries have been established since the beginning of the Mechanical Revolution.

It was not until 1913 that the Board of Education officially recognised these schools as a separate type and issued special regulations for them in clear contrast to those for Secondary Schools. An extract from the regulations is as follows:-

> "These new regulations are not intended to promote the establishment of courses planned to furnished a preparation for the professions, the Universities or higher full time

technical work. The establishment of such courses is work appropriate to Secondary Schools and will not therefore be aided under these regulations."

The inclusion of a foreign language in the curriculem would only be approved if it could be shown to be of direct vocational value in connection with the occupation for which the school provided. The school was to provide for a continuance of the moral, intellectual and physical education given in public elementary schools, and the hours were to be 30 hours per week.

The first Junior Technical School was opened on the North East Coast in 1914 at Heaton, Newcastle-on-Tyne, and after the War similar schools were ~~shkninsd~~ opened at Scotswood-on-Tyne, Sunderland, Middlesbrough and Darlington.

The Curriculum of the Junior Technical School.

The composition of the time table of a typical Engineering Type Junior Technical School is given below:-

Subjects.	Hours Per Week.	
English	4½	
History	3/4½	6
Geography	3/4	
Mathematics	5½	
Mechanics	2¼	12¼
Physics	3	
Chemistry	1½	
Technical Drawing	3	
Geometrical Drawing	1½	4½
Workshop Practice (Metalwork & Woodwork).	4½	
Physical Exercises (Gymnasium)	¾	
Organised Games (Football, Rugby, Cricket, Tennis, Swimming, Hockey	2	2¾
French (For 30% of the boys only who miss other lessons)	2¼	
Total Hours per Week	30	

French is now taken by 30% of the boys in each form of certain of these schools, for three periods of ¾ of an hour each per week, the remainder of the forms continue with other subjects of the curriculum. A very special case must be made out for the inclusion of French in the curriculum of these schools before it is permitted.

Note:- (The Sunderland Junior Technical School has particular reasons for the inclusion of French in the curriculum which will be found in the chapter on "Existing Facilities for Technical Education".)

SUBJECTS OF THE CURRICULUM.

The most interesting characteristic of the Junior Technical School curriculum is the way in which the subjects are correlated and applied to the particular needs of industry in the area in which the school is situated. In addition, every school has a literary side which includes History, English, Geography. The Geography deals with physical and economic aspects and the History course includes Industrial and Social History.

Woodwork. The workshop side of these schools is of the first importance in the curriculum. In woodwork the workshop is fitted with lathes, drilling machines, Morticing Machines and other woodworking machinery. The work done is of a direct vocational nature and it is usual for boys to work in teams on large jobs such as making cupboards, library cases, desks, tables, stools, newspaper racks, simple patterns for moulding, picture frames, and a certain amount of inlaid work. Very little of the work is taken away by the boy, he is made to understand that there is more honour in sharing the work of creating some really useful article than there is in making trifling articles for himself.

Metalwork. The metal work room is usually well equipped with machinery such as lathes, drilling machines, grinders, forges shaping machines and all of the usual small hand tools found in any workshop.

Moulding is done in several Junior Technical Schools. A loam bin is usually required and "linotype metal" is used for casting. ø (This is done at Sunderland J.T.S.).

The work done is of a direct vocational nature, all fancy articles are cut out of the schemes. Accurate work is demanded on the lathes and comparative testing methods are usually employed. The models done are of great variety and such things as are Surface Gauges, Calipers, Chisels, Garden Tools, Fireside Companions Sets, Ventilators, Spouts, Measure and Scopps, etc. are examples of the type of work done. Occasionally a job is done in which a team of boys co-operate, such as the making of treadle lathe, but it is usual for each boy to have his own job to do. Workshop drawings are not done in the Workshop they are copied by the boys from sheets, which they take home.

Technical Drawing and Geometry.

These subjects are carefully correlated with best Drawing Office practice. It is usual for the boy to make a freehan sketch of the machine part and then from his sketch making working drawings with sections and other details. Occasionally tracings are made and blue prints taken off. The Machine parts are carefull selected from engineering works in the area, and are graded in difficulty. Simplified wooden models of machine parts are found useful at the beginning of the course when drawing details are not required. Lectures are given on workshop practice with regard to Joints, fastings, bolts, nuts, threads, etc., and a large scale working modeal of a double acting steam engine is invaluable for demonstration purposes.

The Geometrical Drawing is carefully correlated with the other drawing work and a very high standard is attained, it is this subject which gives the student the means of tackling new problems, the Technical drawing provides the scope for applying the methods besides training visual perception, and giving skill at drawing and engineering knowledge.

MATHEMATICS.

This subject includes Practical Algebra, Mensuration, Geometry, Trigonometry and Logarithmic Calculations applied to Trigonometry and Mensuration. Mental tests are given regularly

while Arithmetic is revised in the first year, and Graphs are done which have real meaning and utility, some Schools find that the Calculus can be approached at an early age by graphical methods.

Science.

A change of the Science curricula of all Engineering types J.T.S.Schools particularly in the North East Coast area is foreshadowed as a result of the "Private Memorandum" at present being considered by the Committeee of H.M.Engineering Inspectors ø

ø Private Manuscript circulated to certain J.T.S.Schools.

Their suggestions were privately circulated to certain Junior Technical Schools during 1933 for the opinions of the staff, the proposal was that these schools were preparatory to more specialised courses of study provided in Evening and Day Part-Time classes and not complete in themselves, therefore a unified course was desirable and not a number of specialised parallel streams of Electricity, Chemistry, Heat, Hydrostatics, Mechancis, etc.

The following extract gives the essence of these suggestions:-

"It is therefore suggested that the Science Course should be built quite deliberately round two ideas:-

1. The convervation, conversion and transmission of Energy:-
   Energy.in (a) in mechanical form
   (b) as heat
   (c) as chemical energy, including vital energy
   (d) as electrical energy
   (e) as radiation (light and sound)

11. The properties of matter which are involved in the operation and construction of machines and structures in energy exchanges. This would be limited to the common metals, wood and some natural material, air, water, some simple fuel and the products of their combinations. A few other substances would be brought in to illustrated chemical changes and give ideas about acids, bases salts, electrolytes and the conservation of matter".

The suggested "Energy Approach to Engineering Science" was discussed during the "Short Course for Engineering Teachers" held at Merton College, Oxford, July 1933, and as a result of the discussion it appeared that H.M.Inspectors had modified their suggestions somewhat. The writer was present, and on his own responsibility he wishes to make certain observations on the "Energy Approach" which will be strictly prepared from his own notes of important speeches made by certain distinguished Authorities on this subject.

"We should approach Engineering Science by all available means and not be any one method to the exclusion of all others. The

suggested "Energy Approach to Science" and the suggested "Kinematical Approach" to Mechanics. ø could be used to assist methods and courses already in existence but not to replace them entirely.

ø "The Kinematical Approach to Mechanics is a rival theory to the "Energy Theory of Approach".

"A certain transfer of subject matter will take place, i.e. Energy as supplied to Mechanics, to Physics, to Chemistry, etc; but there will be no alteration in the actual time allocated for Science teaching. In order to accomplish this more ambitious course in the same time lecture demonstrations should be freely used and qualitative rather than quantitative results should be aimed at. Teachers are encouraged to experiment in methods of present Science and would be advised to adopt abbreviated methods of note taking for their students, elaborate accounts are not required".

This new movement in Science Teaching is the first really scientific attempt to correlate Engineering Science in Junior Technical Schools with the clear cut aims of the Engineering Industries of the North East Coast. The evolution of the Mechanical Age within the area, commenced with the invention of machines to convert the thermal energy of the coalfields into Mechanical Energy and then new methods of Energy Conversation were invented and coupled with new methods of power transmission, giving Diesel and Electrical transmission. Parallel with these advances came the great struggle for materials and the great Iron and Steel Industry. It is therefore only reasonable that an area concerned with Energy Conversion, Transmission Systems and the winning of materials should regard this new movement in Science Teaching as essential to the success of the educational provision for industry.

There is also a strong case to be made for the training of the "Mechanical Sense" of the recruit to industry by the inclusion of "Kinematics" in the Approach of Mechanics. Engineers who are to deal with transmission mechanisms require to know "how a piece will move" rather than the condition of its statical equilibrium. Many excellent mecahnical devices for testing this ability to think how a compound mechanism will move have been suggested in a recent book. ø ("Mechanical Aptitude by John W.Cox, 1928 Methuen.)

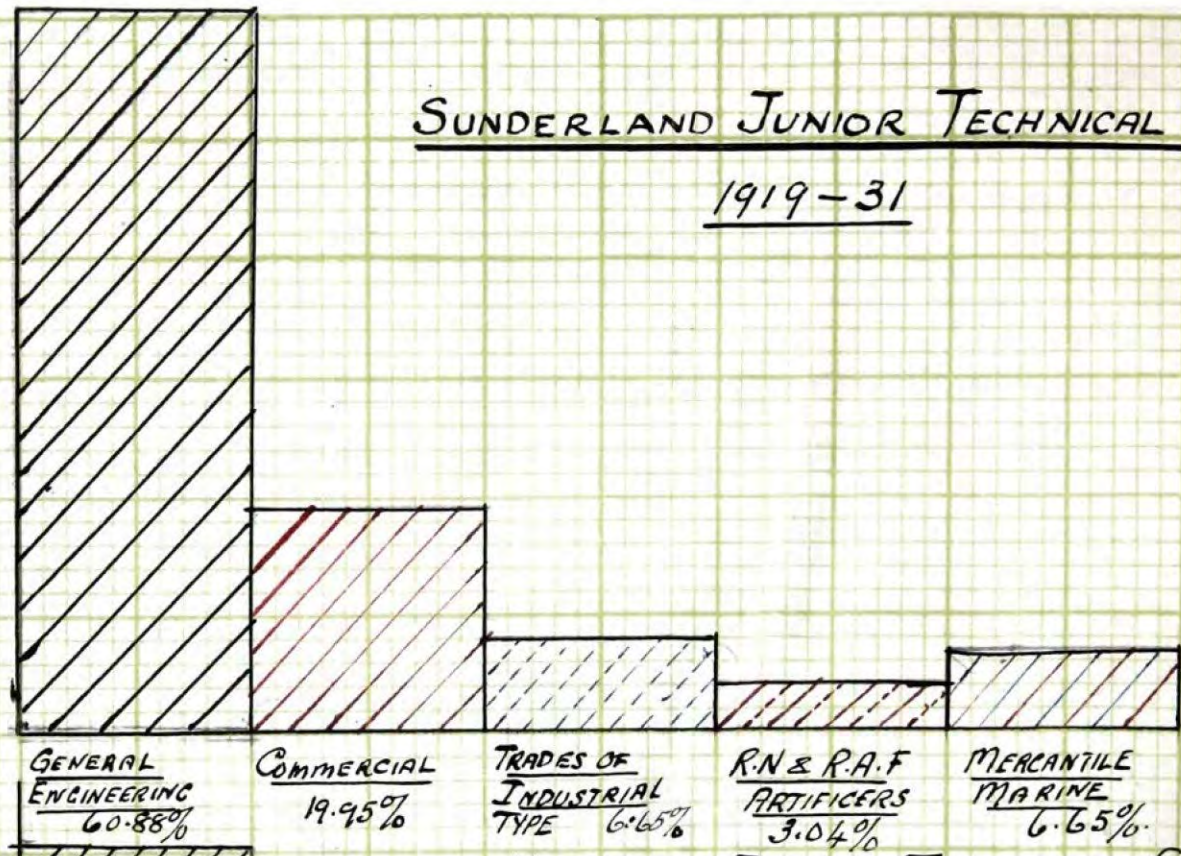
<u>Occupations of Junior Technical School Leavers.</u>

The occupations of leavers from several of the Junior Technical Schools in the area have been analysed and plotted on a chart in the form of diagrams (see chart).

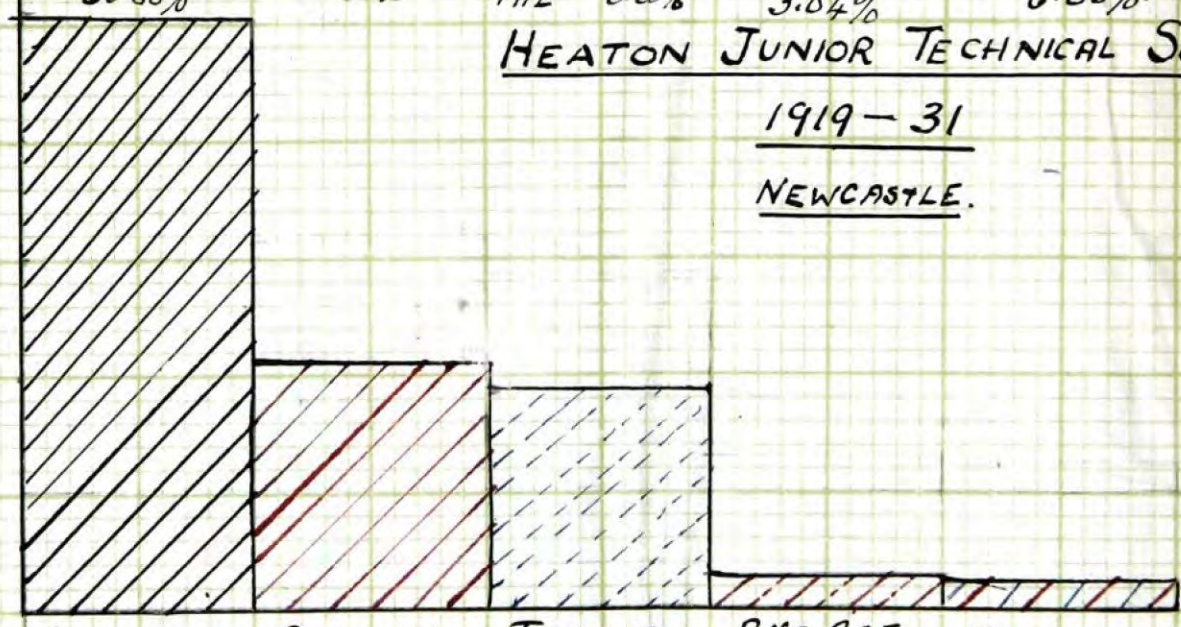
PERCENTAGE OF STUDENTS IN VARIOUS OCCUPATIONS

SCALE 1 sq = 10%

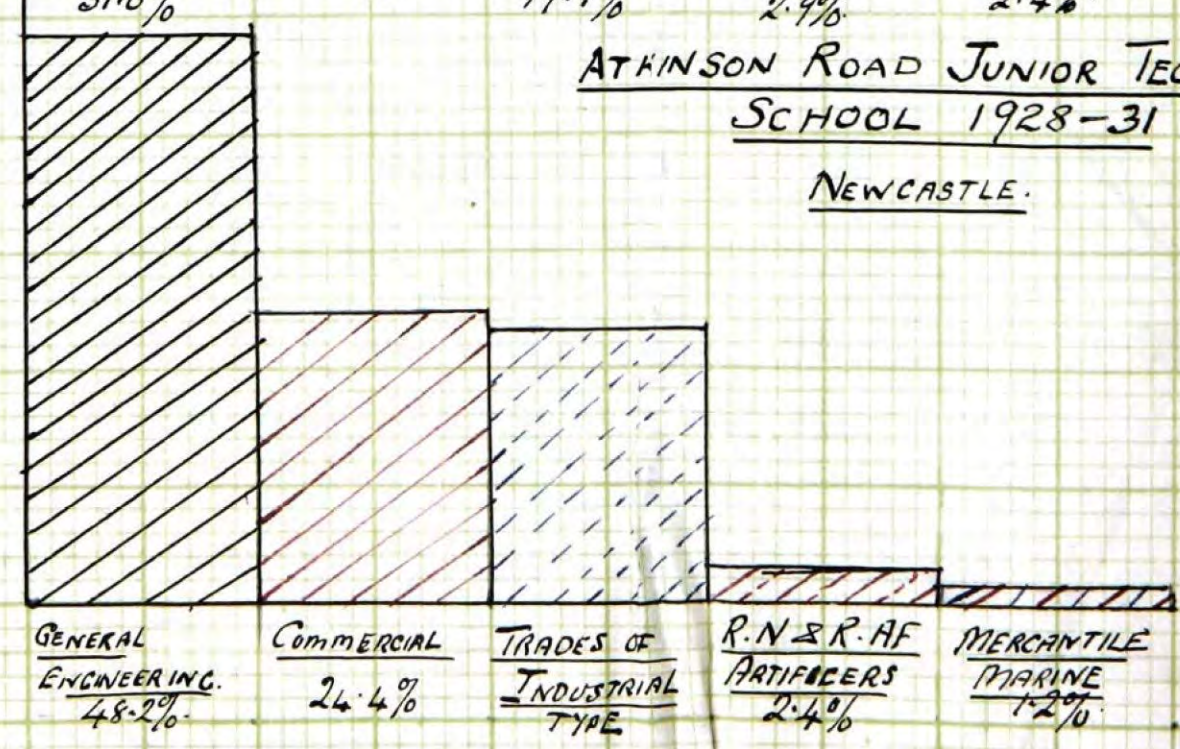
SUNDERLAND JUNIOR TECHNICAL SCHOOL
1919–31



HEATON JUNIOR TECHNICAL SCHOOL
1919–31
NEWCASTLE.



ATHINSON ROAD JUNIOR TECHNICAL SCHOOL 1928–31
NEWCASTLE.



The characteristics of the various diagrams can be compared but actual percentages cannot owing to certain difficulties in the way of collecting information to be exactly comparable. As no useful purpose would be served by making such a rigorous comparison the Headmasters who so generously provided the writer with facilities for getting this information would perhaps prefer the the writer's methods of presentation.

The nomenclature used when analysing occupations of leavers was definitely settled before commencing the analysis of record cards and school leaving registers; and a full explanation of the detailed methods of classifying occupations into 5 main groups will be found in a Memoranda. APPENDIX I.

The occupational characteristics of these Engineering type of schools are clearly seen if the occupations are re-grouped as in the following table:-(SEE ALSO STATISTICS TABLE 12)

Occupational Characteristics of J.T.S.Schools.

School.	General Eng. R.N. & R.A.F. Artificers Mercantile Marine.	Trades of Industrial Type.	Commercial Work.
Sunderland 1919-30	70.57%	6.65%	19.9%
Heaton 1919-30	56.8%	19.1%	24.6%
Atkinson Rd. Scotswood. 1928-30	51.8%	23.2%	24.4%

These schools are drafting more than 75% of their leavers into industry and the remainder generally find commercial work as an alternative, when industry is depressed.

The Junior Technical School is well understood by those connected with industry, and very strong support is given for its continued existence in the educational system by the "Committee on Education for the Engineering Industry" in their Report on "Education for the Engineering Industry" 1931. as follows:-

Extract. Chap.11, Par.11. "We believe that the industry could profitably absorb a larger number of Technical School boys. These boys are normally some of the most promising recruits and it is significant that they, perhaps more than any other class of young worker, realise the importance of increasing their qualifications by attendance at Evening Classes after employment.

Chap.21, Par.12. "In the second place as we have said we assume the continuance of the Junior Technical School as a distinct entity after the raising of the school leaving age up to 15 years. We understand that a good deal of discussion is going on in educational circles from this point. We wish very emphatically to recommend the retention of these schools and to record our belief that no other type of school is likely to be an adequate substitute for them."

RECRUITMENT FROM SECONDARY SCHOOLS.

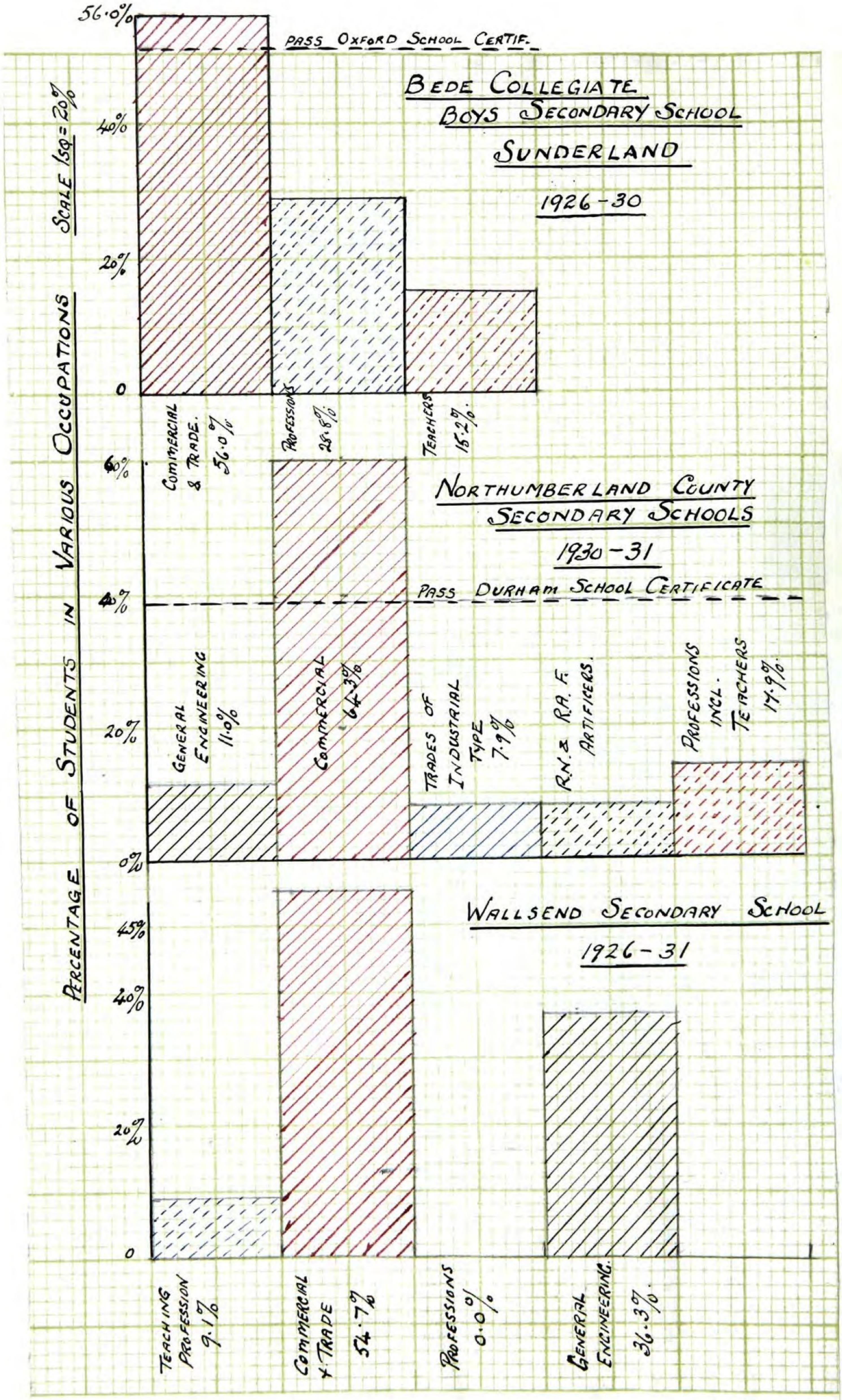
CURRICULUM. The regulations for Secondary Schools 1905-6 define Secondary Schools as those which offer to each of their scholars up to and beyond the age of 16 a general education, physical, mental and moral given through a complete graded course of instruction of wider scope and higher standard than that given in Elementary Schools. The course was four years and now commences at 11+ years, but the student usually remains at school up to 16 - 18 years.

The following is an example of the type of curricula available to the students, it is usuall for the students to take a general course in the first year and later they are permitted to specialise in either Science or Art subjects.

English language and Literature, German, French, Italian, History, Geography, Music and Singing, Latin, Physical Exercises, Woodwork and Metalwork.
Accountancy, Economics, Shorthand,
Physics, Chemistry, Mathematics, Nature Study, Drawing, Private Study, Homework.

The vocational courses of Accountancy, Economics and Shorthand are only available to older students who have passed their examinations and are preparing for commercial careers. All of the other subjects are taken with the definite object in view of passing a certain leaving certificate examination which is to some extent a gauge of the effieiency of the students passing through such schools.

However the success of the Secondary School as a training ground for an occupation must be judged ultimately on what it accomplishes compared with its aims, and not by any arbitrary examination standard.



PERCENTAGE OF STUDENTS IN VARIOUS OCCUPATIONS
SCALE 1 SQ = 20%
BEDE COLLEGIATE
BOYS SECONDARY SCHOOL
SUNDERLAND
1926-30
PASS OXFORD SCHOOL CERTIF.
56.0%
40%
20%
0
COMMERCIAL & TRADE. 56.0%
PROFESSIONS 28.8%
TEACHERS 15.2%
NORTHUMBERLAND COUNTY
SECONDARY SCHOOLS
1930-31
PASS DURHAM SCHOOL CERTIFICATE
60%
40%
20%
0%
GENERAL ENGINEERING 11.0%
COMMERCIAL 64.3%
TRADES OF INDUSTRIAL TYPE 7.9%
R.N. & R.A.F. ARTIFICERS.
PROFESSIONS INCL. TEACHERS 17.9%
WALLSEND SECONDARY SCHOOL
1926-31
45%
40%
20%
0
TEACHING PROFESSION 9.1%
COMMERCIAL & TRADE 54.7%
PROFESSIONS 0.0%
GENERAL ENGINEERING. 36.3%

A questionaire was sent to the Headmasters of various Secondary Schools in the area and in many cases a personal interview was arranged to obtain some knowledge of the school organisation, together with the opinions of the Headmasters. The form of questionaire is given below:-

Questionaire.

Year.	1926 1927	1927 1928	1928 1929	1929 1930	Aver. Nos.	% of Leavers.	Proportions of those Leaving.
Nos.of Pupils present.							
Passed School Certificate.							
Went into Teaching Profession.							
Commerce and Trade.							
Professions.							
Nos.Leaving.							

The statistics collected will be found in Appendix but they have also been diagrammatically represented for comparison of characteristics of the occupation analysis of certain schools (see diagrams). Appendix 5 Table 13.

Bede School, Sunderland.

The remarkable characteristic of the Bede School analysis is the high percentage entering professions, by adding the entries into general professions into those entering the teaching profession, the following analysis is obtained:-

56% Commerce and Trade.

44% Professions.

Of those leaving 4 enter commerce and trade, 2 enter professions and one enters the teaching profession. Only occasional students enter the engineering industry.

Rutherford College, Newcastle. (Secondary School).

This school has been subject to great changes in its organisation since 1926 and the figures can be compared with other schools, although the characteristics of the analysis leave no doubt as to the trend of the occupations taken up by the leavers.

It is clear that a great majority enter commerce and trade and only a small proportion enter professions, and only occasional students enter engineering. Of those leaving 11 enter commerce and trade, 2 enter profession and one enters the Teaching Profession.

During the period 1928-30/the leavers per annum of an average number of 78 entered commerce and trade and an average of 20 entered professions (including teaching).

Northumberland County Secondary Schools.

The statistics used have been obtained from the private report of the Northumberland Education Committee 1932 February and have been represented diagrammatically for purposes of anaylsis. See chart. The occupations shew some variation from what would be expected of such schools as follows:-

Occupation.	Northumberland County Secondary Schools.
Commerce and Trade.	65.1%
General Engineering. (including R.N.& R.A.F)	17.1%
Professions (inc.Teaching).	17.8%

The order of occupations taken up by leavers of these schools makes an interesting comparison with the order of occupations taken up by Junior Technical School leavers as follows:-

Junior Technical School Leavers.	Northumberland Secondary School Leavers.
(1) General Engineering	(1) Commerce
(2) Commerce	(2) General Engineering
(3) Trades of Industrial Type	(3) Professions
(4) R.N.& R.A.F.Artificers	(4) Trades of Indust.Type
(5) Mercantile Marine	(5) R.N.& R.A.F.Artificers.

In 1926 a careful count of numbers of students completing their courses at Northumberland Sec.Schools was made and the results are given in the following table:-

Completion of Service 1926.

Completion of Service.	Scholarship Holders.	Fee Paying Students.
Completing 4 Years.	86.0%	66.0%
" 5 "	70.0%	44.0%

Note. All students have special places now.

The evidence here suggests that leavers for Commerce, Trade and Engineering are responsible for this breaking up of the 4 and 5 year courses which would make them too old for apprenticeship. It is also fairly certain that these early leavers are responsible for the relatively low percent passes in school certificate examinations of the Northumberland schools. (see diagram).

Wallsend Secondary School.

This is a relatively small school with an average attendance of 143 boys, it is situated in the heart of the industrial Tyneside, and many of the students enter industry as their parents are engaged in it and can assist them to get placed; there is no Junior Technical School in the vicinity.

The occupations of leavers are represented diagrammatically and indicate a very striking characteristic when analysed, as follows:- (See diagram also)

Engineering (including R.N.& RA.F.)	36.3%
Commerce and Trade	54.7%

Only occasional students enter professions, the average is about one or two each year. This school is therefore supplying recruits into groups of industries usually catered for by the Junior Technical Schools, the only difference is that this school supplies about 60% of its leavers with the Durham School Certificate.

At Wallsend, mechanical drawing takes the place of art in the school curriculum and this school has therefore deliberately developed an "Engineering Side" to its curriculum, and has practically abandoned the "Fetish" of training for the liberal professions.

Interview. Dr.Merriman, Headmaster, Wallsend Sec.School.

Dr.Merriman recognised that many Secondary School situated in industrial areas did not supply the liberal professions. He thought that on the Tyneside one of the Secondary Schools should prepare exclusively for the liberal profesions, the others should provide for School Certificate, but definitely bias the curriculum with respect to local requirements of industry or commerce. This would mean transference of students and would present certain travelling difficulties.

The Secondary School Position on the North East Coast.

When the Secondary School position on the North East coast is compared with the national position of Secondary Schools as far as occupations are concerned; certain differences are at once obvious. The report of the Committee

on Education for Industry states that 1925-6 the following occupations were taken up by Secondary School leavers.ø

See "Education for the Engineering Industry" 1931 chapt.2, par.13.)

	% Sec.School Leavers.
Professions (other than teaching, clerical or commercial)	65.8%
Industry (inc.agriculture and manual operations)	28.5%
Others	5.7%

It was stated that there was a marked tendency for Secondary School boys to enter commerce or the professions rather than industry. Such a statement can hardly be applied to this particular area, however true it may elsewhere.

The Bede School at Sunderland provides an exception to the usual occupational analysis for Secondary Schools in this area and it actually does cater for the professions, commerce and trade. (see Bede School analysis). Mr.Bradshaw, Headmaster of the school, believes this to be due to the exceptionally large and densely populated region feeding the school, and also to the inadequate provision of Secondary education in the region. No other single Secondary school on the N.E.coast draws its scholars from such a large population and area.

The other Secondary Schools sampled in the area shew that these schools are chiefly supplying recruits to Commerce, Trade, and Engineering and to a very much less extent to the Professions. In the case of Wallsend Sec.School the position has been accepted, and the curriculum altered to the occupational demands of the Region. But in other schools there is reason to believe that the 90.0% who do not wish to enter profession are being dragged over courses suitable for the 10% who do wish to enter.

Dr.A.MESSER (Chairman of the Northumberland Educ. Committee) points to this fact in a summary of his report for 1930 as follows:-

"In view of the extraordinary cost of Secondary Education (approx.£130 per pupil for a 5 years course) and so little being achieved I think that all the facts should be carefully taken into consideration with a view to the revision of the curriculum."

The Effect of the Educational Division of Juveniles at 11+ Years.

The need for a universal system of Post Primary education was urged by the "Hadow Committee" which presented its report in 1926. The chief recommendations of this Committee have now/almost been universally followed by Education Authorities, and now all children are examined at 11+ years of age and graded; the best are sent to the Secondary Schools for a 4 or 5 years course to finish at 16 or 18 or 19 years. The next batch are sent to either Central School or Senior Elementary Schools to remain until 14+ or 15+ years.

If there is a Junior Technical School in the area then a further examination is held at 12 or 13 years, and those successful are given a vocational course until 15+ years. The entrants for the Junior Technical School selective examination are taken entirely from the Senior Elementary and Central Schools; as this examination is voluntary, it is largely left for the parents to determine whether the boy shall sit or not. There are several inherent faults in the present system of selectionfor Post Primary education which militate unfairly against the Junior Technical School. Although the extent to which this faulty selected has affected the type of boy admitted is not easy to determine.

The problem to be faced, is, supposing that all Post Primary Schools admitted scholars at 11+ years on the same examination, would the most successful candidates still tend to choose the Secondary School first, and if unable to get in there, would a greater or less percentage of the remaining candidates choose the Junior Technical School before the Central School. And lastly, would the Junior Technical School benefit to any greater extent than it does at present at the expense of the Central School candidates.

The root of this problem lies in the desire of parents to secure healthy and pleasant conditions of environment during their children's school life. It is unfortunate that the existing Junior Technical Schools on the N.E.Coast are housed in inferior buildings, often converted from some other use, none of them compare favourably with the new Secondary and Central School buildings, either as regards external appearance, design or the locality in which they are placed. Also many parents are

unable to appreciate the new social standards being created and wish their children to be educated in those schools which have in the past supplied the professions and middle classes, in the hope that they will achieve a certain social status by doing so.

In spite of these serious drawbacks the Junior Technical Schools in this area are remarkably successful. The standard of work done is very high and the ex-pupils form the bulk of the most succesful students in the Technical Colleges. (see composition of Higher Technical Classes).

At Sunderland there is only one Secondary School and one Junior Technical School and two Central Schools. As there is undoubted inadequate provision of Secondary Education in the Region both the Central and J.T.S. schools benefit from a selection of candidates who would normally largely pass into the Secondary schools. It is noteworthy that at Sunderland a number of the best Central School students enter the Junior Technical School examination at 12+, although the Central School is a new building and the Junior Technical School is a converted building in a slum unvironment.

The Sunderland Junior Technical School is definitely recognised as the feeding ground for the Technical College which is now a University College, and furthermore the Engineering trades in the Region look to this school first when they require recruits, consequently the school has no difficulty in placing about 80% of its students in industry.

It is fairly evident that <u>in its present school buildings and often inferior environment</u> that the Junior Technical School would not improve its selection to any extent by admitting pupils at 11+ on the same examination as for Secondary and Central Schools.

<u>Methods of Improving the Selection of Junior Technical School Students</u>

Under the present conditions the selection could definitely be improved by including a Personal interview in the entrance examination at 12+, and only those admitted who are definitely "employable" and without such physical defects as would prevent their admittance to the engineering industry. The vital things

which secure a youth his first employment are first his "Employabilitt" and secondly the standard of training which he has received at his previous school. Examination certificates are of minor importance to the employer and all he asks from the Junior Technical student is to see a report of his progress during his school course.ø (Middlesbrough J.T.S.has an internal leaving certificate examination and ôther J.T.S.schools issue term reports)

If any further development in selection is to be hoped for then the Junior Technical School must be housed in buildings as equally as attractive as other Post Primary Schools.

Provision must also be made for a limited number who are ambititious to rise to the higher ranks of the engineering profession above that of an artisan worker. For this xxxxxxx reasons a foreign language should be included in the curriculum for a limited number only (at Sunderland J.T.S.30% of the students take French).

There are many good reasons for opposing the suggested lowering of the age of entry for Junior Technical Schools to 11+ years even with improvements in school provision. It has been found in practice that it is almost impossible to give a general education to one group of students in a school and a specialised vocational education to another group which will command the confidence of industry, indeed this is one of the most serious criticisms offered against the Central School as a training ground for the engineering trades.

At present a considerable economy in staffing is made by admitting pupilés at 12+ or 13+ to the J.T.S., the Senior Elementary and Central schools in effect provide a cheaper general education for the boys admitted to the J.T.S.School than it would be possible for the J.T.S.Schools to provide themselves, owing to different salary scales of the staff.

The survival of the excellent "Engineering Type" of Junior Technical Schools will be assured if arrangements are made by which they can use other forms of Post Primary Schools to provide that general education essential to students who are about to commence a vocational course of which engineering science is an important part.

Finally local conditions are important factors in recruitment to Junior Technical Schools. If there is a clear understanding between the Central and Junior Technical School of the aims of each school then no trouble is experienced in obtaining Central School students to enter for the Junior Technical School entrance examination at 12+ or 13+ years.

But if there is antagonism due to confusion of aims between these two schools, practically no transfer of students occurs, in that case it would be better to report on this difficulty to the Advisory Committee of the Junior Technical School who would make the necessary recommendations to the Education Authority, rather than consider a lowering of the age of entry to 11+ years.

Interview. Mr.Mills, Headmaster, Middle Street Central School, Walker-on-Tyne.

Mr.Mills said that from 11+ to approx.14 years there was a general liberal education given similar to that provided in Sec.Schools. During the last 3 years the practical or commercial bias was increased according to the boys own choice. Technical meant practical as far as Central Schools were concerned. The boy was taught how to use his hands and many crafts were given for his selection. He intended to send those who wished to enter engineering industries on to the Junior Technical Schools, which were in his opinion, more directly vocational and thorough in its technical course than either desired or aimed at in the Central School.

JUVENILE UNEMPLOYMENT.

Introductory.

The problem of Juvenile Unemployment is at present being vigorously tackled by the Ministry of Labour and to a minor extent by the Board of Education. The history of the attempts made to solve this serious problem can be followed in recent publications of the Ministry of Labour commencing with the First Report of the National Advisory Council for Juvenile Employment, 19th May 1929. A chronological list of publications by the Ministry on this subject has been arranged in the classified bibliography. ø (See APPENDIX B.)

The First Report recommended the provision of Junior Instruction Centres and they were subsequently provided for an experimental period from 1st January 1930 to the 31st March 1933.

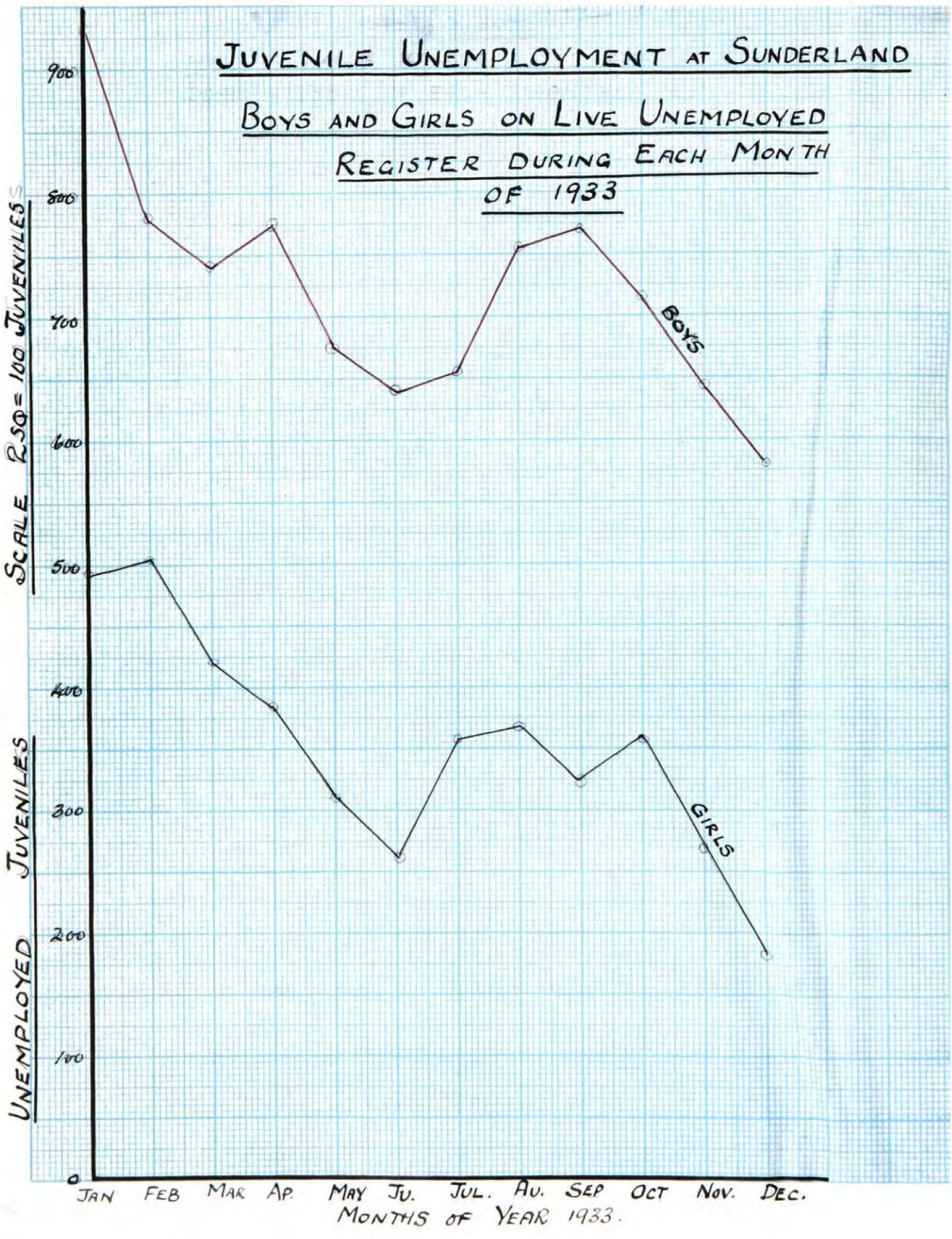
Dimensions of the Problem.

The dimensions of the present problem of Juvenile Unemployment are revealed in the "Report on the Work of Local Committees for Juvenile Employment during the Year 1933" (For Official Use). The total number of insured Juveniles in Great Britain at July 1932 was 977,000 and the average monthly figure for 1932 of boys and girls unemployed was about 166,000. As there is no compulsion for unemployed Juveniles to attend the Exchanges unless they wish to receive money benefit, the unemployed figure is a calculated approximation.

In December 1932 there were 189 Juvenile Advisory Committees appointed by the Ministry of Labour, and 107 Education Authorities were exercising "Choice of Employment Powers." A "Memorandum" issued by the Ministry of Labour 1929 on the "Shortage, Surplus and Redistribution of Juvenile Labour during the years"1928 to 1933 suggested that Juvenile Unemployment varied considerably in different parts of the country largely due to the

JUVENILE UNEMPLOYMENT AT SUNDERLAND

BOYS AND GIRLS ON LIVE UNEMPLOYED REGISTER DURING EACH MONTH OF 1933



lessened decrease in the birth rate in certain munition, armament and coal mining areas during the war.

A surplus of Juvenile labour was anticipated in Durham County and some of the Tyneside towns, and migration to areas where there was a shortage of Juveniles, was suggested as a possible solution of the problem. A good indication of the Regional distribution of Juvenile Unemployment was given in the Ministry of Labour's Annual Report for 1932 (as below)

Regional Distribution of Juvenile Unemployment.

Division.	Average Monthly Percent of Unemployment Among Insured Juveniles.	
	Boys ø	Girls ø
London	5.1	3.2
South Eastern	5.2	5.4
South Western	5.9	5.6
Midland	6.9	4.8
North Eastern	11.2	8.7
North Western	10.4	8.6
Scotland	11.4	9.5
Wales	13.7	12.3
Great Britain.	8.4	6.4

Local Juvenile Unemployment.

The foregoing table revealed that the N.E.coast is one of the worst areas in the country for Juvenile Unemployment and it is therefore interesting to study the actual problem of the surplus in one representative locality in the area such as is Sunderland Borough.

From the figures supplied by the Secretary of the Sunderland Juvenile Advisory Committee a graph of average monthly unemployment for boys and girls has been plotted for 1933. (See graph) It will be seen that the surplus is least during the summer months and also about Christmas time. But it is estimated that only one third of the unemployed Juveniles report for benefit. It is obvious from the graph that there is about a maximum monthly surplus of boys and girls of the magnitude of 3,300 i.e. (3 x 1000)

ø See Appendix for statistics provided.

TABLE. 5.

The Provision of Juvenile Instruction Centres.

The First (1929) and the Third (1930) Reports of the National Advisory Council for Juvenile Employment (SEE APPENDIX 5) dealt with the provision of criteria for establishing Junior Instruction Courses and with certain modifications to the criteria in cases where there was an insufficient number of Juveniles and where unemployment was of a short duration.

An important modification was as follows:-

Extract. "Third Report Page 12 Summary 5".

> "It should be made more generally known that boys and girls, who during periods of unemployment wish to take up or continue studies of a more advanced character or more suited to their individual requirements than those provided in the normal centre of class, can obtain permission to do so without prejudicing their claims to unemployed benefit".

This recommendation has important repercussions and provides Secondary and J.T.S.Boys in particular with an alternative to the Junior Instruction Centre if they wish to draw benefit. They are allowed to attend approved Day or Evening classes at Technical Institutes instead.

The Curricula of the Junior Instruction Centre.

The organisation of the Junior Instruction Centre differs from that of all other existing educational institutions in the way in which the courses are organised to meet a constantly changing mass of Juveniles and variations in labour conditions. As most of these centres are closely adapted to local conditions, variations in curricula are to be expected, and each centre has an individuality of its own.

The following is the type of curricula found in these schools on the N.E.coast, and the Sunderland Centre has been taken as representative of them (Boys Centre).

Curriculum (Boys Centre 14-18 Years)

Metalwork (Workshop Course)
Woodwork (" ")
Handicrafts (Repousse Metalwork - Tinplate etc.)
Automobile Course (Repairs etc. and overhauls)
Technical Drawing and Geometry (and calculations)
Electrical Installation Course (wiring)
Physical Training.

At Sunderland 500 boys of 14 - 18 years attend one Centre on five half days a week, thus a school with accommodation for 250 students is worked on a double shift. The Juveniles spend their free time either looking for work or in any other way they wish. The instruction is entirely practical although lectures are given by instructors on various trade subjects, it is noteworthy that much of the apparatus and equipment used has been improvised from old material.

In the workshops it is usual for each set of boys coming through to tackle the same jobs, thus encouraging the team spirit in the workshop and obviating certain difficulties in the arranging of separate work for boys who would perhaps never finish it. Discip-line is maintained in these centres by sending for the parents of unruly members and if this fails they the deliquent is reported to the Advisory Committee who are able to stop or suspend his benefit.

About 2,000 Juveniles pass through the centre per annum, and of those who leave at 18 years approximately 5% fail to get placed, this is very satisfactory when it is realized that about 20% of the Juveniles passing through are classified as unemployable.ø There are occasional Secondary and J.T.S.boys on the books but they are either unemployable or boys who have not continued their further education and who wish to draw benefit. Employers draw on this centre for many kinds of labour and are usually well satisfied with anyone recommended by the Centre.

ø This approximation was given by the Principal of the Sunderland Centre.

Administrative Changes in Unemployed Insurance.

The whole problem of Juvenile Unemployment is at present in the melting pot, and all previous enquiries and recommendations by the National Advisory Council and the Ministry of Labour have been formulated and embodied as a Government Unemployment Insurance Bill, which had its first reading in the House of Commons on the 8th November 1933, and which comes up again for its final reading and discussion in April 1934.

The Chief proposals dealing with Educational problems in the Bill are as follows (briefly) :-

(1) The minimum age of entry into insurance is to be lowered from 16 to the school leaving age for the time being in force and benefit will be payable to the claimant direct at 16 years instead of 16½ years as at present.

(2)Dependents benefit will be paid to the parents of all unemployed juveniles between the ages of 14 - 16 whether they attend the Junior Instruction Centre or not, provided that he is unemployed for reasons out of his control.

(3) Juveniles under 16 years who continue in full time education beyond the school leaving age will receive a credit of contributions up to a maximum of 20.

(4) In any area where the number of unemployed juveniles is considerable, the Local Education Authority will be under obligation to provide a Junior Instruction Centre with the assistance of a grant. Attendance at these Centres will be compulsory.

(5) Adults over 18 years who are unemployed will be provided with courses to improve their physical fitness and improve their chances of employment. Part of the scheme includes a short period of actual employment, at the usual rate of wages paid by the Local Authority to Municipal workers.

Local Effects of Administrative Changes.

The provision of Junior Instruction Centres for unemployed Juveniles between 14 - 18 years recommended in the Government Bill will raise interesting problems in the N.E.coast area where there is a considerable surplus of unemployed Juveniles.

The Sunderland Education Authority have estimated that there are 12,000 Juveniles between 14 - 18 years in the borough and about 9,000 of these will have employment, leaving about 3,000 unemployed. ø[1]. This figure compares well with the estimate of the Juvenile Advisory Council who gave 3,300 based on the assumption that only one third of the unemployed juveniles register. ø[2]. It is thus to be expected that about six Junior Instruction Centres will be required at Sunderland each capable of taking a weekly total of 500 boys and girls.

ø[1] This estimate was given by Mr.W.Thompson M.Ed.B.Sc. Inspector and Supervisor of Schools for Sunderland and Superintendent of Evening Schools.

ø[2] This estimate given by Mr.N.R.Armit, Secretary of the Juvenile Advisory Committee for Sunderland (Ministry of Labour Staff).

Many objections have been raised in educational circles at the proposed setting up of a rival school system under the Ministry of Labour. Mr.W.Thompson M.Ed.B.Sc.ø[1] was of the opinion that the Ministry of Labour had not fully appreciated the magnitude of problem of providing fnstruction centres in the depressed areas, he would have wished to have solved the problem within the educational system but realised that this would have been more expensive owing to staff considerations.

Mr.H.R.Armit ø[2] agreed that the magnitude of the problem in the depressed areas called for further consideration before setting up a parallel school system, he thought that large numbers of instruction centres were a compromise to solve an immediate surplus problem which would be partly solved after 1940 when the effects of the post war birth rate increases were no longer felt in the 14 - 18 age groups.

The Junior Instruction Centre is a very near approach to the type of Senior School suggested in the "Hadow Report" on "The Education of the Adolescent" 1926. It is very probable that this vigorous new type of school growing up outside of the educational system will modify ideas on what can be done with the Senior Classes of Elementary Schools. Many of the vocational courses in these schools are really excellent provision for Juveniles about to enter Trades and Minor Industries, and they cannot fail to attract the attention of all educational authorities.

D I V I S I O N III

The Provision and Regional Organisation of Technical Education on the North East Coast.

INTRODUCTORY.

Classification and Nomenclature of Courses.

CHAPTER 7.

(a) The Tyneside Region.

(b) The Northumberland County Region.

(c) The University of Durham (Armstrong College).

CHAPTER 8.

The Wearside Region.

CHAPTER 9.

(a) The Teesside Region.

(b) The Durham County Region.

CHAPTER 10.

School Ocupational Analysis.

EXISTING FACILITIES FOR TECHNICAL EDUCATION ON THE NORTH EAST COAST.

INTRODUCTORY.

The Composition of Higher Technical Classes in the Area.

A fuller discussion of the provision of Technical Education will be reserved for a later section of this chapter, it is sufficient to mention here the different grades of Courses available, the classification of these Courses and the Nomenclature in use for identification purposes.

Grades of Courses.

Evening Classes are divided into the following divisions for administrative purposes.

(a) Junior Courses
(b) Senior Courses
(c) Advanced Courses.

It is usual to hold Junior Courses in different buildings from the other courses as they provide a two year course of general preparation for Technical Courses of a Senior nature. They are only attended by Elementary School leavers and certain Central School leavers.

The Senior Courses are intended for Students who have completed the Junior Courses or who have had equivalent edudcation in some other Post Primary School, i.e. Junior Technical or Secondary. These Courses are held on three evenings per week per session for a period of three years, and they are composed of Grouped subjects of a specialised nature.

The Advanced Courses are usually of two years duration and they are of an advanced and very high technical standard, and only available to those who have completed Senior Courses or their equivalent.

NOMENCLATURE OF COURSES.

The nomenclature for Technical Courses has in the past shewn wide variation, but most Institutions are now adopting the following nomenclature:-

	New Nomenclature.	Old Nomenclature.
Junior Course 1st Year	J1	T1
" " 2nd Year	J2	T2
Senior " 1st Year	S1	T3
" " 2nd Year	S2	T4
" " 3rd Year	S3	T5
Advanced Course 1st Year	A1	T6
" " 2nd "	A2	T7
For Special Subjects Only		T8

Major and Minor Courses.

In order to cater for the needs of the different grades of trainees in Industry some of which are ambitious to rise to the higher ranks of Industry and the Engineering profession, and others who only wish to be skilled workers, it has been necessary to provide two chief kinds of curricula for students, particularly in the Engineering and Allied Industries.

The following extract defines the use of Major and Minor Courses from Chapter 11. p.7, "The Teaching of Engineering in Evening Technical Schools" (Board of Education 1923).

> "Broadly, the Engineering Major Course will provide instruction for persons who aim at becoming leading hands, foremen, heads of departments, designers, etc., while the Minor Course will be mainly confined to the provision of trade instruction for apprentices and artisans in the special subjects of their trade".

The Major Course is covered by the Senior and Advanced Courses, while the Minor Course is parallel with the Senior Course and "End-On" to the Junior Course. Those who take the Minor Courses after afterwards eligible to take the Major Courses.

The Classification of Technical Courses.

The provision of Technical Education can be classified as follows:-

Part Time Classes.

@ Evening Classes
@ Day Courses.

Full Time Classes.

The Evening Classes have been discussed in another chapter and it is necessary to point out that they are essentially restricted in scope by the time allowed and by the fatigue of the students after a day's work, beside the restricted facilities for home work.

The Part Time Day Courses are superior to the Evening Classes, in that fatigue is largely avoided, homework is possible and a greater number of hours are available for lectures. Arrangements for Part-Time Day Courses vary with local conditions, usually about one or two half days a week are spent at College and about two evenings a week at Evening Classes.

The students are all engaged in Industry and are usually able to sit for a "National Certificate" or "Diploma" of a particular College, or a "Higher National Certificate" or in some cases a Degree.

Full-Time Day Courses.

These courses are provided in the following Institutions:-

(1) Universities
(2) University Colleges
(3) Technical Colleges

At the Universities there are three and four year courses extending over nine months in the year, the remainder of the year is spent in the works. At University Colleges it is usual for special arrangements to be made with employers to release students over certain periods for a full time day course. For instance at Sunderland certain students are released for six months in the year. At Technical Colleges similar arrangements are made but whereas the previous Institutions plan their courses for Degrees, the Technical Colleges aim at "Higher National Certificates" or certain professional examinations and only exceptions take Degrees.

TYNESIDE REGION

THERE ARE EVENING CONTINUATION CENTRES AT MOST LOCAL CENTRES

SENIOR COURSES ARE MARKED ⊙

ASHINGTON
MORPETH.
BEDLINGTON.
BLYTH.
NORTH.
SEA.
CRAMLINGTON
SEATON SLUICE
HARTLEY
EARSDON
WHITLEY BAY
SEATON SLUICE
MONKSEATON
STANNINGTON
SHIREMOOR
N. SHIELDS
TYNEMOUTH
S. SHIELDS
PONTELAND
COSFORTH
WILLINGTON
S. COSFORTH
WALLSEND
TYNE DOCK
R. TYNE
ARMSTRONG COLL.
WALKER
JARROW
NEWCASTLE
HEBBURN
RYTON
BLAYDON
GATESHEAD
MONKTON
W. BOLDON
E. BOLDON
BIRTLEY.
SUNDERLAND
CONSETT.
WASHINGTON
R. WEAR.

NORTHUMBERLAND COUNTY.

DURHAM COUNTY

KEY:-

⊙ SENIOR TECHNICAL INSTITUTE COURSES (EVENING)

Δ JUNIOR TECH. SCHOOL

SCALE 4 m/s.

E. J. ARNOLD & SON LTD LEEDS GLASGOW & BELFAST

EXISTING FACILITIES FOR TECHNICAL EDUCATION ON THE NORTH EAST COAST.

THE TYNESIDE REGION.

The Tyneside Regional organisation of Technical Education is diagrammatically represented on the chart (see opposite), it will be observed that the Rutherford College is the Central Technical College of this extensive industrial region.

The most important centres other than this College are at Wallsend, Gateshead, Jarrow and Tynemouth, in these cases the Evening Technical Institute is held in the local Secondary School buildings. There are numerous Evening Continuation Schools held in Elementary, Central and Junior Technical Schools in the region which supply the Rutherford and other Technical Institutes with students of an Elementary school type.

There are two Junior Technical Schools and several Secondary schools in the region which directly supply students to the T4 courses of the Rutherford and outlying Colleges.

THE RUTHERFORD COLLEGE.

Classification of Courses.

There are Part-Time Courses for Mechanical and Electrical Engineering Apprentices who attend in two batches of about 80 students each at different periods in the year. (i.e.Total 160 per annum.) The "A" Section attend from September to January while the "B" Section attend from January to the end of June each year, and a complete course usually covers 3 years. The apprentices selected attend on three occasions during each week of which one or more is held during the day time and the others in the evening. They are selected on merit by the various works in the district, and the College Authorities further scrutinise their credentials.

There are also Evening Courses which represent the most important work of this College. The following figures clearly

show the relative magnitude of the various types of Part-Time Coures.

1933 - 34.

Total Evening Students	=	1837
Part-Time Day Apprentice Students	=	150
Total Part-Time Day and Evening Students.		1987.

(Figures Provided by the Principal).

The Provision of Full Time day courses is restricted chiefly because a Day Secondary School is held in the same building as the Technical College and laboratories, etc., are in use.

Travelling and Capitation.

The degree to which this College serves the surrounding region with technical education can be gauged from percentage of students enrolled from outside the City of Newcastle, as follows:-

1933 - 34 Evening Classes.

Total Evening Students from Newcastle	=	990
" " " from Outside the City.	=	847
Total Evening Students		1,837.

$\frac{847}{1837}$ = 46.12%

Hence 46% of Evening Students attending this College come from outside of the City. This percentage is not surprising since many of the best residential districts on the Tyneside are now outside of the City, which is rapidly becoming filled with business premises.

Travelling Fees.

Travelling arrangements were in the past left largely to the individual, but now owing to the migration of population away from the centres of all big towns and cities, where the Technical Institutions are usually situated it is becoming evident that either the Local Authorities will have to assist the students to travel to such centres or they will have to de-

centralise these Central Technical Colleges and provide smaller units in the residential areas.

Durhan County provide travelling expenses for all approved students but other Authorities have different practices. Northumberland County grant 50 Exhibitions of the value of tuition fees and travelling expenses tenable at Technical Institutions in Newcastle, but do not grant travelling fees to all students who attend with permits but without free exhibitions. Furthermore, a "Means Test" is applied to all those applying for travelling expenses. The Tynemouth and Gateshead Authorities allow students to attend Rutherford College with a permit but do not grant travelling expenses.

Capitation Fees. ø

In order to prevent the overcrowding of Central Technical Colleges, and to ensure the proper use of outlying Technical Institutes by students living near them; Capitation Fees have been used for this purpose for many years now. These fees are also used by various Authorities to compensate for the technical facilities provided by such Authorities, and used by students from other Authorities.

The methods of applying Capitation Fees vary between different Authorities in the following ways:-

(a) One Authority issues a Block Grant and no privilege voucher to individual students, and hence no investigation of credentials.

(b) Two Authorities pay a Block Grant and insist upon an examination of the credentials of the student before issuing a privilege voucher to attend.

Durham County pays a per capitum grant, so much for every student, and issues a privilege voucher. Northumberland County, Gateshead and Tynemouth pay a Block Grant; and generally, unless Newcastle has a Block Grant with an authority; a student must either produce a privilege voucher or pay the capitation fee himself. In the latter case the student may apply to his Local Authority for a per capitum grant which may be granted after a "Means Test", as at Sunderland which has no Block Grant arranged with Newcastle.

ø Dr.E.C.Edgar, Principal of Rutherford College, explained the general principles of capitation.

The present system of capitation is by no means fair towards all students, and wherever there is an absence of a "Block Grant" or "per capitum" arrangement existing between Authorities, anomalies are found to occur.

One of the most striking anomalies ⸗ of the Capitation system exists in the transfer arrangements between Sunderland and Newcastle and vice versa. Bother Sunderland and Newcastle have certain courses which are unique in the counties of Northumberland and Durham, and to which students from each Authority are attracted. Sunderland Technical College has advanced Pharmacy courses and Newcastle Rutherford College has Gas Engineering, and Gas Supply, and the Heaton Junior Technical School has a City and Guilds Course of Metal Work.

Sunderland applies a Means Test to all students wishing to travel to Newcastle and as a result most of these students pay their own Capitation, travelling and course fees. In the case of school teachers wishing to take a City and Guilds course no fees are granted and teachers are compelled to pay all of their own fees, one of the reasons advanced against school teachers is that such a course is not essential to their present position if they are engaged as a teacher.

However this attitude of the Authorities is definitely unfair and ignores the Educational fitness of the individual to benefit by such a course. The objections raised against school teachers wishing to attend courses for their own professional advancement, are surely unreasonable when all other students attending technical institutions do so not because they must, but because they hope to equip themselves there for better positions.

Departments.

The following departments have been organised to provide chiefly for Evening Students:-

⸗ These anomalies were personally investigated by the writer.

Departments.

Civil and Mechanical Engineering
Shipbuilding
Electrical Engineering
Mathematics and Physics
Chemistry
Mining
Architecture and Building
Art
Royal Sanitary Institute Department.

These departments have courses suitable for National Certificates in the following subjects:-

Ordinary and Higher Certificates.

Mechanical Engineering
Electrical "
Building Construction
Chemistry
Gas Engineering

In addition these departments offer suitable training for the professional examinations of the following Institutes:-

Institution of Mechanical Engineers
" " Electrical "
" " Chemistry
" " Civil "
" " Structural "
" " Mining
" " Surveyors
Royal Sanitary Institution and Inspectors.

City and Guilds of London examinations are taken by students in appropriate subjects covered by the courses provided. The Pharmacy course prepares students for the Preliminary Scientific Examination.

In addition to all other examinations there are London University Degree courses available to students in Engineering and Science. (Providing they are Matriculated.)

Major Evening Courses.

Major Group courses are held in the following subjects, each course leads to some recognised qualification either of a professional institution, the City and Guilds of London, the Northern Counties certificate or some other authoritative body. The prospectus of the college should be consulted for further details.

(See the following list)

Major Grouped Courses.

Mechanical Engineering	up to T7
Gas Engineering and Supply	" " T7
Marine Engineering	" " T6
Heating and Ventilating Engineering .	" " T5
Automobile and Internal Combustion Engines	" " T6
Diesel Engine Design	" " T7
Electrical Engineering	" " T7
Telegraphy	" " T5
Telephony	" " T5
Shipbuilding and Naval Architecture .	" " T7
Mathematics	" " T7
Physics	" " T7
Chemistry	" " T7
Industrial Chemistry (all branches) .	" " T7
Metallurgy	" " T6
Mining	" " T7
Architecture (Inter.R.I.B.A.)	" " T7
Building Construction	" " T7
Art	" " T5
Optics	" " T5
Pharmaceutical Chemistry (Prelim. Scientific Exam.)	" " T7
Sanitation and Food Inspection	

Single Major Courses.

Diesel Electric Course	" " T4
Electric Traction	" " T4
Radio Engineering	T5 - T6
Electrical Measurement and Control ...	T8
Engineering Economics and Workshop Management	Profess.Exams.
P.O.Draughtsmen Course	Up to T6.
Estate Agency	Final Exam.
Municipal Surveying	" "
Matriculation.	

Many of the Major Courses mentioned include many sub-divisions, e.g. Industrial Chemistry, this includes a very wide range of subject matter dealing with all local industries and processes in which chemical knowledge would be useful. The Prospectus should be consulted for more detailed information.

MINOR COURSES (Further details from the Prospectus)

Foundry Practice
Industrial Chemistry (some branches)
Woodworking trades.
Plumbing and Sanitation
Painting and Decorating
Bricklaying, Masonry and Concreting
Handicraft Courses
Art Courses (some of them)
Gas Fitting
Electrical Installation Work
Bakery and Confectionery
Glassblowing (for Science Students)
Flour Milling
Tracing Office Practice
Firemen and Stokers Class
Electric Welding.

Commercial Courses.

Although there are no Commercial Courses available in Rutherford College, yet there is excellent provision for all commercial careers in the Newcastle College of Commerce and also at Wallsend Evening Technical Institute.

The Adaptability of the Technical Provision to Technical Changes in Industry.

The most striking feature of the provision of technical education at Rutherford College is the variety of the courses offered and the close adjustment of the curricula to the needs of Tyneside industries.

There are more special subject courses designed to meet part time requirements, than in any other Technical Institution on the North East coast. The sub-division of the courses is particularly noticeable in the Chemistry Department, and is evidence of the increasing scientific importance of chemistry in all industrial operations. Although the chemical industry is perhaps more firmly established in the Teesside than in the Tyneside Region, yet a recent Industrial Survey ø revealed how widespread were the variety of Minor Chemical operations on the Tyneside.

The following is an example of how a department has been sub-divided to provide for scientific variations.

Chemistry Department.

Pure Chemistry (Organic, Inorganic, Physical.)
Industrial Chemistry
Oils and Fats
Pigments, Paints and Varnishes
Iron and Steel Manufacture
Non-Ferrous Metals
Technical Analysis
Laundry Chemistry
Glassblowing (Laboratory)
Foundry Practice
Metallurgy
Bakery and Confectionery
Pharmaceutical Chemistry
Physics
Pharmaceutical Botany
Lubricating Oils
Flour Milling
Gas Manufacture
Gas Engineering

ø "Industrial Survey of the North East Coast" 1930.

In other Departments special courses have been arranged to apply the students' general knowledge of scientific principles to some special branch of industry, these courses are best suited to students who have completed a National Certificate course or its equivalent.

The adaptability shewn by this college in meeting the demands of local industries has resulted in an increasing sub-divisi(of departments. It would appear that further sub-division was inevitable and particularly in the Chemical and Engineering Departments. The variations of the courses will tend to be of two distinct types, first there will be advanced special subject classes to assist the adjustment of those who are well trained in scientific principles, and secondly there will be Minor Courses chiefly concerned with instruction in processes, for those who are intending to be operatives only.

The Institution of new courses will lead to overcrowdin in the present Institution unless some Minor Courses are de-centralise that is organised in some outlying institute or building. The only other alternative is the provision of a new Technical College large enough for all of the present needs and adequate accommodation provided for all future requirements.

THE COMPOSITION OF EVENING HIGHER TECHNICAL CLASSES.

It was suggested by H.M.I.Mr.A.H.Stelfox that itwould be possible to find out how the Engineering Industry was supplied with recruits from various types of schools by analysing the Evening Class registers and enrolment forms for advanced engineering courses T5, T6, T7, T8.

This was done for Rutherford Technical College Evening Courses and the statistics revealed the following order as of students attending classes from various types of schools:-

(1)	Junior Technical School.	36.7%
(2)	Secondary School.	34.8%
(3)	Elementary School.	28.2%
(4)	Private Schools.	Negligible.

This analysis was made for Mechanical, Electrical and Shipbuilding Courses and more detailed statistics are given as follows:-

RUTHERFORD TECHNICAL COLLEGE.

EVENING COURSES T5, T6, T7.

1930-31

SCHOOL	MECHANICAL ENG.	ELECT. ENG	SHIPBUILDING	TOTAL	PER. CENT.
SECONDARY	48	41	7	96	34·8
JUNIOR TECHNICAL	64	30	7	101	36·7
ELEMENTARY & CENTRAL	39	37	2	78	28·2
OTHERS (PRIVATE)	1	-	-	1	0·3.
				276	100·0%.

ϕ STATISTICS FROM ANALYSIS OF REGISTERS AND RECORD CARDS.

Newcastle is well supplied with Secondary Schools and has two Junior Technical Schools. It is therefore very encouraging that two small Junior Technical Schools, Heaton and Atkinson Road, can supply more recruits to the Engineering profession than all the Secondary Schools in Newcastle and the surrounding district. The result indicates that the Junior Technical Schools are fulfilling their duty of preparing recruits for Engineering; and it suggests that a large number of Secondary and Elementary School Boys would benefit from a Junior Technical School type of training. There is evidence here for an extension of the nu ber of Junior Technical Schools in the Newcastle district.

OTHER TECHNICAL INSTITUTIONS IN THE TYNESIDE REGION.

Wallsend Evening Technical Institute (Held in Secondary School)

This Institute provides a Group Course for ordinary National Certificates in Mechanical Engineering only. Senior Courses are also provided in Electrical Engineering T3 - T5, and Shipbuilding T3 - T5, but they are not recognised for National Certificates. A First Year Senior Course T3 is available in Building Construction, and Senior Commercial Courses T3 - T4 are also available. In addition there are special single subject courses of Dressmaking, Millinery and Cookery and special free lectures are given on Engineering subjects.

Continuation Classes are available in Domestic, Junior Technical and Junior Commercial subjects (T1 - T2). The examinations usually taken from this Centre, excluding the

National Certificate are Northern Counties examinations and certain commercial examinations (Royal Society of Arts and London Chambers of Commerce).

Gateshead Evening Technical School (Held in Secondary School)

Senior Courses are provided in Mechanical and Electrical Engineering T3 - T4, also in Building Construction and Plumbing T3 - T5, but none of these courses are recognised for National Certificates. Those wishing to obtain National Certificates are transferred to Rutherford Technical College for the more advanced courses (See Prospectus for conditions).

Northern Counties and City and Guilds of London examinations are usually taken by the students in these courses. Teachers Handicraft classes are held which are suitable for City and Guilds of London Certificates. Other courses are available in the following subjects:-

Needlework and Dressmaking
Advanced Cookery
Handicrafts
Painting and Decorating.
Art.

Continuation Classes are organised in other schools in the district for Junior Technical and Junior Domestic work T1 - T2.

Capitation and Travelling.

Students other than those in Durham County are obliged to pay a Capitation Fee, but approved Durham County students are allowe both Capitation and Travelling Fees to attend this Centre.

Travelling Fees are not allowed to students attending the Rutherford College from Gateshead owing to the proximity of the two Centres. Gateshead students have their fees returned to them during their First Year Evening Courses if they return a satisfactory attendance and homework record.

TYNEMOUTH EVENING TECHNICAL SCHOOL.
(Held in Municipal High School, North Shields)

The Senior Courses provided are of two kinds, Technical and Commercial. None of the Technical Courses are recognised for National Certificates, and Northern Counties or City and Guilds examinations are usually taken by the students in appropriate courses. Permission to attend more advanced courses outside of the

Borough (usually at Rutherford College) is given to approved students who are unable to find such provision locally. Students using the Tynemouth Centre from outside the Borough must produce a permit from the Local Authority or pay a Capitation Fee. Free places are available to Higher Courses on the results of examinations and a certain number of free exhibitions are awarded to students who wish to study in advanced courses chiefly at other Institutions.

The courses provided at this Institute are as follows:-

Technical Courses.

Mechanical Engineering
Motor Car "
Electrical Trades
Naval Architecture
Plumbing
Building Construction
Woodworking Trades
Architecture
Painting and Decorating
Arts
Crafts
Upholstery & Soft Furnishing
Tracers
Music
Domestic Courses

Senior Commercial Courses.

General Commercial Courses
Professional Courses (Accountants, Secretaries, etc.)
Shop Assistants Courses.
Speech Defects "

NORTHUMBERLAND COUNTY EDUCATION AUTHORITY EVENING CLASSES.

Although some of the Technical Institutions situated in Northumberland have been described as part of the Tyneside Regional system, there are numerous Centres providing either Junior or Senior courses of Technical Instruction outside of the Tyneside Region. The Director of Education for Northumberland very kindly provided mm the writer with the following authorative statement on the provision of County Evening Classes.

Extract. (From letter received from the Director of Education).

"The Technical Instruction provided in the County Evening Classes (including Wallsend Borough) is based on the Syllabuses of the Northern Counties Technical Examinations Council comprising the following courses:-

Junior Courses. First and Second Year Technical.
Senior Courses. Mechanical Engineering
Electrical "
Shipbuilding
Mining
Building and Allied Trades.

At the majority of the District and Local centres students take Junior Courses of instruction (Commercial, Domestic or Technical - First and Second Year). Instruction in the advanced courses is provided at:-

(1) District Centres where facilities are available including Ashington, Berwick-on-Tweed, Blyth, Morpeth, and Wallsend, and

(2) Technical Institutes in Newcastle-upon-Tyne Where by arrangement with the Local Education Committee students from the county area may attend on payment of the ordinary class fees or as Exhibitioners nominated by this Authority, and Exhibitions covering tuition fees and where necessary railway or omnibus fares".

The Technical Facilities available for county students have already been discussed as part of the Tyneside Regional system. The Continuation Schools do not require any special mention as they are usually organised in the vicinity of Local or Senior District Centres. The only remaining Senior Centres of importance are at Blyth, Morpeth and Ashington, and Berwick-on-Tweed.

Ashington Evening Classes (Senior Courses)
(Held in Local Central and Elementary Schools)

There are courses of Domestic subjects available for women in various local evening schools. In addition the following Technical subjects are available from T3 - T5 in each course:-

Mechanical Engineering
Mining
Electrical Engineering
Land and Mine Surveying

Other special subjects such as Building Construction and Woodwork together with certain commercial subjects of a senior type are also available.

Blyth Evening Centres.
(Held in Secondary and Elementary Schools).

The courses provided here can be divided into three broad divisions in addition to the usual Continuation Classes in Technical and Commercial subjects as follows:-

(1) Technical Senior Courses
(2) Commercial Senior Courses
(3) Special Subject Senior Courses

The Technical Section is composed of T3 - T4, Mechanical Engineering and Building Construction Group Courses, whilst the Commercial section includes T3 - T4 General Commercial courses. The special section provides the following variety of subjects:-

Special Subjects.

Electrical Engineering
Automobile Engineering
Mining
Plumbing
Sanitary Science

Retail Traders Courses
Handicrafts (General)
Fine Arts Classes
Woodwork and Metalwork
City and Guilds Courses

Domestic Subjects
Art (General)
Ambulance and Nursing.

Morpeth Evening Classes.

These classes are divided into Commercial, Mechanical Building and Domestic Subjects. These subjects are of a general nature and they are not of a high standard, they are however useful for students who wish to obtain a free Exhibition for the more advanced courses available in the Tyneside Region.

THE UNIVERSITY OF DURHAM.

The Provision of Technical Education at Armstrong College, Newcastle-on-Tyne.

Armstrong College is one of the constituent units of the University of Durham and it is to all practical purposes a self contained University, indeed it possesses more departments than the majority of similar institutions (per The Registrar) The College was founded in 1871 and it was originally intended for the Faculty of Science in the University of Durham. In 1909 this Institution attained the full rank of a University College, and Arts Degrees were then obtainable here.

Courses of instruction are now given leading to the following degrees:-

Pass and Honours Degrees.

Arts
Architecture
Pure Science
Mechanical Engineering
Marine "
Civil "
Electrical "
Naval Architecture
Mining
Metallurgy
Commerce (Pass only)
Law (LL.B.)
Agriculture

In addition there are Degrees of Ph.D. in Arts or Science for Research students, and Diplomas are available in the Theory and Practice of teaching, and in the various subjects of the College.

Numbers of Students.

The total student population of this College is given in the "Armstrong College Calender" for 1932 - 33 as follows:-

1388 Students Total
822 (Full time students in attendance)

The well developed corporate life and the ample provision of social amenities at once distinguishes this College from all other Institutions providing technical instruction on the North East coast

The Regional Relationships of Armstrong College.

The Armstrong College Faculty of Applied Science has for a long time been regarded as the premier school for a very wide industrial area, extending over all the Northern Counties from the Midlands to the Scottish border. Indeed certain of the Departments of Applied Science are famous throughout the country and in some cases throughout Europe and Scandinavia and the British Empire. A combination of circumstances have made this particular Faculty largely patronised by the privileged classes and particularly by those who form the "Employer Class" in the North East Coast area. ø

The ordinary fees charged at Armstrong College together with the cost of living and other items prohibit the ordinary student from attending, and in this particular Faculty there are found two distinct types of students, one belongs to the privileged employer industrial class and the other to the scholarship class.

Recently the Sunderland Technical College became affiliated to Armstrong College in the Department of Engineering only; and a very complex situation has arisen from this fusion. Past history reveals that this affiliation was neither sort for nor desired by Armstrong College, but owing to a promise exhorted by

ø "Engineering Training for Officers Rank" Transactions of the N.E.C.Inst.1929-30.

Sunderland from the University Authorities in 1906, Armstrong College was bound to accept this affiliation when Sunderland had raised the standard of Engineering training given to the requirements laid down by Armstrong College. ø

ø Note:-
It is generally accepted that this promise was obtained by strong political persuasion of the University Authorities by the then powerfull parliamentary representatives of Sunderland.

The effect of this affiliation has been to open the degrees of this hitherto privileged faculity of Applied Science to numbers of students who would ordinarily have been unable to have obtained such a qualification, either because of prohibitive expenses or because they were unable to obtain one of the few entrance scholarships to this faculty.

Sunderland Technical College is able to offer much cheaper facilities for Engineering training than Armstrong College owing to the "Apprentice Studentship Scheme" and also to the fact that Sunderland College is subsidised by a Municipal Grant which enables this College to lower its fees considerably below these of Armstrong College. The majority of the Engineering students obtain free studentships at the expense of the Sunderland Authority, thus Sunderland is able to provide almost free University education to students in the Engineering Department whereas Armstrong College, which has no Municipal grant but only a relatively low Treasury grant, is forced to charge fees which prohibit all except the privileged classes, and a few holders of open scholarships.

There is certainly a case here for Regional adjustment although there does not appear to be any easy solution to the problem. It wassuggested by the Registrar of Armstrong College (Mr.W.S.Angus, M.A., LL.B.) when interviewed, that one solution of the problem might be in the National Control of Municipal and Treasury grants to University Colleges. He thought that some control of the present situation was desirable, particularly in view of the fact that although Sunderland could provide cheaper facilities for Engineering training, yet Armstrong College was better equipped with Engineering Apparatus

and could afford to bribe the most distinguished professors in the country to its Chairs of Applied Science; whereas Sunderland was unable to exploit Municipal grants in this way.

There is an unfortunate possiblity that unless some adjustment between the two colleges is made, that Sunderland will become to be regarded as providing a Minor Degree courses, and not specially adapted for giving the most authoratative technical instruction in certain Applied Sciences.

The Adaptability of the Technic al Provision at Armstrong College to Technical Changes in Industry.

It is accepted by all Engineering Authorities including those responsible for the National Certificate examination, that an advanced Technical Institute must base its courses to some extent on the equipment and apparatus at its disposal; and for this reason colleges and similar institutions are permitted to set their own internal examinations and have their own syllabuses.

The equipment of Armstrong College Engineering Department is very largely composed of Transmission Mechanisms, which are representative products of the phases passed through by the Transmission Industries in the Area.

It is perhaps for this reason that the curricula of the Engineering courses at this college is heavily loaded with specialised information concerning the various phases of the evolution of transmission systems. There are many good points to be put forward in favour of this "bias", perhaps the chief argument is that as this college has become practically responsible for the training of the "Officer Class" of industry on the North East Coast, it is therefore imperative that they should receive a training adapted to the particular work that they will be subsequently engaged in managing. The limited time available for the University training of Engineers, has accentuated this "bias" towards the Transmission Industries.

The chief objection of the organisation of the Engineering Courses provided at Armstrong College lies in the

lessened chance of the courses being adapted to Technical changes in Industry, owing to the necessity of loading the curriculum with subject matter for the benefit of engineers in the Area who will be responsible for the maintenance of past phases of the transmission Industries.

No criticism can be made on the quality of the courses provided, there is perhaps no better provision in the country than that provided here for particular transmission industries.

Suggested Methods of Improving The Adaptability of The Faculty of Applied Science to Technical Changes.

This problem is one of providing a course of instruction adapted to the needs of those who are to be concerned with the maintenance of declining phases of transmission industries, so strongly represented in the area; and at the same time to provide others, and particularly those who have no special influence to obtain posts in these older industries, with a type of instruction more adapted to Technical Changes in Industry which will enable them to take up positions if necessary in other industrial areas or in different phases of the engineering industry.

It would be very difficult to provide both a General Engineering course and a more specialised course in the same department, particularly with small numbers of students. But it would be possible to transfer all those requiring a more general course to Sunderland Technical College where this problem could receive special attention.

Another alternative would be to permit students in Applied Science to take Double Degrees, for instance a student might be allowed the following combinations, and others if necessary:-

(a) Marine Engineering and Naval Architecture.
(b) Marine and Mechanical Engineering.
(c) Civil and Mechanical Engineering.
(d) Mechanical and Electrical Engineering.
(e) Mining and Mechanical Engineering.
(f) Electrical Engineering and Physics (Sound & Wireless etc.)

These courses would normally occupy four years, and the change over would take place after two years.

NEW DEPARTMENTS OF APPLIED SCIENCE.

Several factors have militated against the formation of New Departments in this college. The necessity of preserving courses of instruction for the older industries, and the great expense of equipping a new department, particularly when the existing courses are not well used, have been sufficient to prevent any recent extensions.

Armstrong College might well study the methods adopted by the chief Central Technical Colleges when forming new departments. For instance when Birmingham Technical College desired to institute a Department of Aeronautics, one of the lecturers in Engineering was asked to study this subject and gradually commence giving instruction in the subject, the other Departments of the College were to provide other subjects related to the science.

Armstrong College could easily provide a course of Aeronautics using the present staff, and with very little additional equipment, the course could at first be a Diploma Course of one year available to all graduates in Engineering; later it could be included as a subject for a Double Degree and having a 2 years course. There are good facilities for Practical Aviation at Cramlington, and at Hylton near Sunderland, there are facilities for Military Aircraft Training. At present the Aircraft Industry is not represented on the North East coast but this need not precent the forming of a new department, indeed it is a subject which would attract a new type of student to the college, who did not seek for any privileged position in the industries of the area but rather looked outside of the Area for his chance of a career.

A course might also be provided to cater for those Electrical Engineering students who would like to enter the new fields of Wirless and Sound transmission and Cinematography. An increasing number of openings are available in these new fields of Applied Science, and so far, there is very little provision of such training nationally.

Recruitment to Industry from Armstrong College.

The Engineering students from this College who obtain responsible positions in the North East Coast Industries are almost entirely drawn from the "Premium Apprentice" class or from students who have had a privileged Industrial training.

In 1926, the then Principal of Armstrong College, Sir Theodore Morrison, read a paper in the form of a questionnaire to the North East Coast Institutions of Engineers and Shipbuilders on, "How should an Engineer be trained". The Institution appointed a committee to deal with this question and to prepare an authoritative reply embodying the opinions of all important employers in the Shipbuilding, Mechanical and Marine Engineering industries in the Area. ø

The report was issued in 1929 and dealt exclusively with the training suitable for the privileged type of apprentice, and it was made clear that only those with some acquaintance with the scientific principles of engineering, and some general scholarship and practical knowledge of all trades or professions which are employed in engineering works, are considered eligible for Junior posts in the management of industry. The following is an extract from the Repprt which lends support to the suggested plan of courses adapted to Technical Changes as distinct from a generalised course dealing chiefly with scientific principles underlying engineering, and with an intensely professional and academic outlook. See Extract.

Extract.

> "It is not self evident that scientific knowledge and scholarship give the engineer an increased potentiality of attaining positions of high responsibility in the profession since many who have in the past been deservedly pre-eminent in engineering have been men of neither a wide professional knowledge nor any pretensions to scholarship. In fact a too academic outlook can be a serious bar to the attainment of preminence in engineering as in other spheres of human endeavour where success depends so directly on co-operating, initiative and leadership".

ø "Engineering Training for Officers Rank", Transactions of the North East Coast Institute of Engineers and Shipbulders Vol.XLVI. 1929-30.

The report also recommended a University degrees as a "label" for officers rank, but was quite clear in its inference that many other qualities besides a degree were desirable for those who wished "officers rank" in industry; the following extract illuminates this point:-

> "He is essentially a man of action; and his scholarship is only of full advantage to him if it does not lessen his capacity for making up his mind and for learning from experience."

It is particularly significant that those commanding industry, insist upon "Employability" as a final test of selection rather than academic qualifications.


NORTH
SEA.
R. TYNE.
NEWCASTLE.
GATESHEAD
JARROW
HEBBURN
MONKTON
W. BOLDON
E. BOLDON
WHITBURN
FULWELL
SOUTHWICK.
SUNDERLAND
WASHINGTON
STANLEY
SOUTH MOOR
CONSETT.
R. WEAR.
CHESTER-le-STREET
SILKSWORTH
RYHOPE
HOUGHTON-le-SPRING
SEAHAM HARBOUR.
HETTON
DURHAM.
EASINGTON
HASWELL
BLACKHALL COLLIERY
SEDGEFIELD.
HORDEN
MONK HESLEDEN
WELLFIELD
WINGATE
W. HARTLEPOOL
SPENNYMOOR
BISHOP AUCKLAND
WEARSIDE REGION
⊙ SENIOR COURSE EVENING INSTITUTE
Δ JUNIOR TECHNICAL SCHOOL.
SCALE 4m/s

EXISTING FACILITIES FOR TECHNICAL EDUCATION ON THE NORTH EAST COAST.

WEARSIDE REGION.

Regional Organisation of Technical Education.

The Organisation Chart (see opposite) diagrammatically represents the system of Technical Education in the Wearside Region. From this it will be seen that the Sunderland Technical College is the hub of the system and all other courses in the Region are subsidiary to those provided in this College (with the exception of the Art School and Teachers Training College).

This Central Technical College is unique on the N.E. Coast inasmuch as it deals exclusively with Major Courses, this peculiarity has been caused by the limited accommodation available and the desirability of concentrating all Major Courses in one building. So limited is this accommodation that all of the T3 (First Year Senior Courses Evening) have been transferred to Institutions outside of the College and in some cases, (Building Construction T3 and T4 and Carpentry and Joinery T6 and T7), higher Courses than T3 are found outside of the College.

The degree to which this College is used by students outside of the Sunderland Borough as compared with those using it from the Borough was ascertained by analysing all of the Day and Evening Enrolment forms in all courses provided by the College. The result was as follows:-

Session 1933-34. (Statistics taken in January 1934).

Total of All Day Students =	121
" " " Evening " =	709
Total Students Attending College.....	830.

Proportion of Total Students from Outside Sunderland Borough.

Evening Students -	219		
Pharmacy & Miscellaneous -	112	349/830	+ 42.05%
Day Apprentice Engineering Students.	18		
Total Students from Outside Borough.	349		

Therefore 42% of the total students attending Sunderland Technical College come from outside of the Sunderland Borough. (Incl.Day, Evening and Part-Time Day Pharmacy and Mining).

TRAVELLING AND CAPITATION.

Durham County makes special arrangements for travelling fees of students attending Sunderland Technical College Evening Classes. There are certain clauses governing the grant, such as the type of Courses attended and whether alternative provision exists nearer the students home, and the students past record. Other students who have to pay their own expenses are able to get Students Contract Tickets on buses and trains or twelve Journey Bus Tickets which are much cheaper than ordinary fares.

Capitation fees were inteoduced by Authorities to regulate the movement of Evening Students and thus make possible economical Regional arrangements when providing evening classes. By imposing a heavy fee (£5/-/- or £4/-/-). It was intended to prevent students from enroling at classes at a distance, when suitable provision was made for them near at home, and also to prevent students from taking courses for which they were not qualified. At Sunderland no capitation fee is imposed on Durham County students who have a "privilege to attend" note from the Durham County Authorities, but other students have to pay the fee unless their Local Authority pays it for them. All students from outside of the borough must have a permit to attend from their Local Eduvation Authority.

Provision of Major Evening Courses.

Sunderland Technical College.

This College is recognised for National Certificate Courses, Ordinary and Higher (i.e. Up to T7) in the following group courses:-

Mechanical Engineering
Electrical Engineering
Naval Architecture
Building Construction.

There are in addition Post National Certificate Courses (i.e.T8) for students who are desirous of pursuing special subjects of an advanced nature such as Diesel Engines, Reciprocating Steam Engines and Turbines. Provisions is made for those requiring extra subjects for the Associate Membership of the Inst.of Mechanical Engineers, and courses of General Education and Economics of Engineering and Workshop Management provided at the West Park Central School are suitable for Sections A and C of the Examination.

Major courses are provided in Automobile Engineering, Architecture, Civil Engineering and Mining, although these Courses are not recognised for National Certificates. The Architecture course covers part of the ground for the Intermediate Examination of Royal Institute of British Architects, the other part of the examination must be taken at Armstrong College Evening School in Architecture. Advanced Courses of Mathematics, Physics and Chemistry are provided, and these courses are varied to meet the particular needs of different types of students and may also be used by those entering for London External General Degrees.

Matriculation courses are provided over a good range of subjects, and languages are well supplied.

There are special courses in Telephony and Telegraphy suitable for City and Guilds of London Examinations. It is also possible for Engineering students to obtain City and Guilds Certificates in Mechanical and Structural Engineering.

A special Biology course is available for teachers.

DAY COURSES. (SUNDERLAND TECHNICAL COLLEGE).

The Departments of Mechanical and Electrical Engineering are affiliated to the University of Durham for Degrees in Applied Science. There are also courses for Pass and Honours Degrees of London University, and College Diplomas are awardéd in Engineering, Electrical Engineering and Naval Architecture. These courses are attended by Apprentice students from the Engineering Works who attend for the six

winter months only. (Degree students in Engineering attend during May and June if permitted by employers).

Pharmaceutical courses are arranged for full time students studying for professional examinations of the Society and Part-time courses are available on Wednesday afternoons and evenings for Apprentice Pharmacists studying for the Preliminary Scientific Examination. The students must attend the full-time course before the final examination. Students may now prepare for London University Degrees in Pharmacy. A special course of Bio-Chemistry is also available for Pharmacists who wish to qualify for Infirmary or Medical Dispensaries.

Materia Medica Courses are there for students wishing to suit for the Pre-Medical Examination in Chemistry and Physics.

Mining Classes are held in the Technical College on Saturdays, they are suitable for those aiming at supervisory positions about collieries, such as Deputies, Managers, Surveyors, etc.

EVENING TECHNICAL INSTITUTE, VILLIERS STREET, SUNDERLAND.

The premises of the Sunderland Junior Technical School are used to house those Evening Courses for which there is no accommodation at the Technical College. There are Major Courses provided in T3 Electrical and Mechanical Engineering. The T3 and T4 Major Courses in Building Construction are also held here, and Major Courses are held in T6 and T7 Carpentry and Joinery. In addition there are Minor Courses in Woodworkin, Plumbing and Bricklaying. An Electric Welding Science Course is available, and the Workshop Welding practice is obtained at the Technical College. (This is a Minor Course.)

The Northern Counties Technical Examination Syllabuses are used for all Technical Courses up to the Ordinary National Certificate Standard, i.e.T5. The Higher National Certificate is an Internal Examination but the Papers are assessed by independent examiners. Many students particularly in the Building Trades sit for the City and Guilds of London examinations which are covered by the Syllabuses of the Northern Counties Examinations.

CONTINUATION SCHOOLS.

Certain of the Elementary Schools in the Borough are used for two year courses of the preparatory nature, which bridges the gap between the Elementary Schools and the Senior Technical Courses. These classes are known as Junior Technical Classes, i.e. T1 and T2 Courses. The subjects of instruction are Mathematics, Drawing, English and Science. Northern Counties Certificates are issued for these courses as they are not recognised for the National Certificate purposes.

Apprenticeship Studentship Scheme for Engineering Apprentices.

A "sandwich" scheme of works and college education has been arranged at the Sunderland Technical College, (since 1903) classes are held during the six winter months (October 1st to March 31st) while the students return to the works during the six summer months (April 1st to Sept.30th).

The course extends over three sessions and the students may take a College Diploma Course or a Degree Course in Engineering (Durham University) provided they have matriculated before entering the Degree Courses. Classes are held in May and June for students taking Degree Courses only (subject to employers' permission.) Apprentices or Students from outside the Borough may attend the Day Course if they pay the tuition fee of £15/-/- per annum.

Scholarships equivalent in value to free tuition at the College are open to all apprentice Students in the Borough and they are awarded on the result of an entrance examination held in September. The Apprentice must have served two years in the works and be under 18 years when he sits the examination. (Special cases are considered up to 18½ years and after one year of Apprenticeship).

The Apprentice must have also attended the Senior Evening Courses up to at least T4 standard. Students who fail to get a scholarship but who are accepted into the Day Course may be granted Free Studentship the following year if his results are satisfactory in his First College Session.

The time spent by an Apprentice at College is counted up as part of his Apprenticeship and his rate of wages is the same as Apprentices who remain at w the works all the time.

The subjects of the Entrance Examination are English, Mathematics and either Machine Construction and Drawing or French or German or Naval Architecture Drawing. The examination therefore consits of three subjects and it gives a fair chance to Secondary, J.T.S. and other types of Students.

THE ADAPTABILITY OF THE PROVISION OF TECHNICAL EDUCATION TO TECHNICAL CHANGES IN INDUSTRY.

Principal E.R.Verity of the Sunderland Technical College put forward a most convincing case in justification of his policy in keeping all of the Engineering Courses on as broad a scientific basis as possible, early specialisation of Courses was avoided to a greater degree than usually found in Engineering Colleges elsewhere. He thought that if a broad training in the scientific principles underlying General Engineering was given, it would be easier for the Engineer to adjust his knowledge to technical changes in Industry, which now occurred with much greater frequency than in the past. In order to assist students to adjust themselves to particular subdivisions of the Engineering Industry, after their broad training was completed, special Post National Certificate Courses were provided in Turbines, Steam Reciprocating Engines and Diesel Engines. Special Courses were also provided in Workshop management and Economics for those studying Works Production.

In the past Courses of "Wireless" had been tried but numbers did not justify such Courses at present. Electric Welding Trade Courses had been started and these classes were definitely ~~Major~~ Minor Courses. He thought that a Technical College would be able to organise a new department on much cheaper lines than a University and hence the Technical College was more adaptable to Technical changes in Industry than the University Colleges which demanded an expensive kind of departmental provision and staff.

A Course of Bio-Chemistry had been arranged in the College and was unique in the North East Coast area.

Sunderland School of Art.

Sunderland now possesses a very fine new School of Art housed in delightful surroundings in Backhouse Park. The curricula is of wide scope and embraces the following chief divisions of courses:-

(1) Fine Arts.
(2) Advertising and Illustrative Art.
(3) Trades and Crafts.
(4) A Teachers Training Department in Handicrafts and Art.

Certificates are awarded by the Royal Society of Arts in various subjects and teachers and others enter for City and Guilds of London Certificates, Educational Handwork Certificates and National Society of Art Masters Certificates in Drawing.

The Trade Courses are interesting and are chiefly concerned with Crafts, some of them have no vocational value, but others have a definite vocational value and are given below:-

(Furniture Design
(Interior Decoration
(Furniture Making

Stone Carving
Sign Writing

Window Dressing
Painting & Decoration
Decorative Confectionery
Printing
Advertising and Illustrative Art.
Dress Designing and Making
Millinery.

Day and Evening Classes are arranged and the Course of Furniture Design and allied subjects is becoming of increasing importance as it attracts Apprentices from Furniture Works and the Sales Departments of shops in the district.

A number of "Special Places" are available each year and there are also several local scholarships available for Sunderland Students (See Arts School Prospectus).

The Teachers Training College.

Sunderland possesses a Day Training College for Women

Elementary School Teachers and is situated at Langham Tower within a Borough. It is mentioned here in order to record a further possible opening for women in the region; a Secondary School education is necessary for entry into this College.

Sunderland Public Library.

Sunderland Borough is already well supplied with an efficient Library System, composed of a Central Library, Museum and Art Gallery and three Branch Libraries. A new and extensive Central Library is about to be built to replace the existing one and a well equipped Reference Library is to be a feature of this new scheme. The Sunderland Library will ultimately occupy a more important position in the organization of the Regional scheme of Education provision, than it does at present, since it will be looked to as the Reference Library Provision of the Technical College and other Institutions in the Region. There is much to be said for opening this proposed Reference Library to all of the students in Advanced Courses at the Technical College, irrespective of the fact that some live outside of the borough. Some arrangements might be come to by the Technical College and Library Committee to grant these facilities and thus obviate the necessary of a Research Library at the Technical College.

SCHOOL PROVISION IN THE WEARSIDE REGION.

Sunderland Junior Technical Schools.

Detailed information as to this type of school will be found elsewhere in this Thesis, it is sufficient to record that this school is organized End-On to the Technical College and that it provides a very good preliminary training in the Scientific Principles underlying Engineering Science, together with General Educational subjects. Boys are admitted at 12+ years on the result of an Entrance Examination and leave after a three year course at 15+ years. They are privileged to commence the T4 Major Courses on leaving this school as Free Students. A fair proportion of these boys Matriculate about one year or so after leaving, and then after this they continue with the T4 Major

Courses in Engineering, until they are ready for the Apprentice Student Entrance Examination at 18 years. Experience has shewn that these boys are among the most successful students of the Technical College Day and Evening Courses in both Major and Minor Courses.

The Secondary Schools.

Secondary School Boys who enter the Engineering Industry at 16 years usually take Matriculation Classes for one year or so and are then permitted to join the T4 Evening Classes until they are ready to sit for the Apprentice Student Examination at 18 years. Many Secondary School boys become Pharmacists and some commence study for the Preliminary Scientific Examination after Matriculating at school, but before leaving. They afterwards become apprenticed to a chemist and join either the Part Time or Full Time Day Course in Pharmacy at the Technical College.

Elementary Schools.

Senior Elementary and Central Schools usually send their students to Continuation Classes for two years and one year respectively. They then pass on to either Major or Minor Courses and follow the usual path for National Certificates.

Elementary School Students have a very difficult path before them and it is not surprising that few can survive the Major Courses. If a boy in an Elementary School is ambititious to take the Higher Technical Classes he should be transferred to the Junior Technical School at 12+ years and the same applies to Central School Students. The Elementary and Central School Students are best suited for the Minor Courses.

THE COMPOSITION OF HIGHER EVENING TECHNICAL CLASSES.

In order to find out how the Engineering Industry was supplied with recruits from various types of Schools, the Sunderland Technical College Evening class registers and enrolment forms were analysed for the session 1930-31, as in the table as follows:-

SUNDERLAND TECHNICAL COLLEGE.
Full Time Day Courses
in Mechnical & Electrical Engineering & Naval Architecture.

Sessions 1933-4	J.T.S.	Secondary.	Central.	Elementary.
Degree 1st	1	-	-	-
2	2	3	-	-
3	5	5	-	-
DIPLOMA 1st	-	-	-	-
2	3	4	1	3
3	6	4	1	1
TOTAL.	17	16	2	4

Session 1932-33	J.T.S.	Secondary	Central	Elementary.
Degree 1st	1	3	-	-
2	3	6	-	1
3	2	5	-	-
Diplomalst	5	6	3	2
2	4	4	2	2
3	8	4	-	-
4	3	3	-	1
TOTAL	26	29	5	5

Session 193132	J.T.S.	Secondary	Central	Elementary
Degree 1st	7	8	-	-
2	-	-	-	-
3	-	-	-	-
4	3	6	-	-
Diploma 1st	11	7	1	3
2	15	3	1	-
3	10	3	-	2
4	7	1	1	-
TOTAL	53	28	3	5

Sessions 1930-31	J.T.S.	Secondary.	Central	Central & Elementary.
Diploma 1st	8	8		2
2	9	4		5
3	9	6		4
TOTAL	32	22		13

Sunderland Technical College

Evening Courses (1930-31) T5, T6, T7, T8

School	Mechanical Engineering	Electrical Engineering	Shipbuilding	Totals	Per Cent %	Proportions
Central & Elementary	41	27	4	72	41·3%	4
J. T. S	26	24	3	53	30·4%	3
Secondary & Private	25	22	2	49	28·3%	3
			Total.	174	100·0%	

ϕ Statistics obtained by analysis of Registers and Record Cards

The analysis at once indicates the following proportions of various types of students attending:-

(1) Elementary School
(2) Junior Technical School.
(3) Secondary School
(4) Private (Negligible)

The Reason why the Elementary School Students bulk so largely in the analysis, is that this Region is inadequately supplied with both Secondary and Junior Technical Schools. It is noticeable that the single Junior Technical School with an average annual output of 80 leavers, can hold its own against all the Secondary Schools in this Region.

SUNDERLAND TECHNICAL COLLEGE DAY COURSES. ANALYSIS OF STUDENT COMPOSITION.

The statistics shewn on the opposite page were obtained from an analysis of Class Registers and Record Card of Students enrolled for Degrees in Applied Science (Durham University) and for those studying for Diplomas in Engineering and Naval Architecture. It will be observed that the Fourth Year Degree and Diploma Courses have been dropped in 1933-34 owing to poor numbers. The figures reveal that the J.T.S.Students preponderate in the Diploma Course (i.e.Matriculation not required) but that they apparently hold their own with Secondary School Students in the Degree Courses.

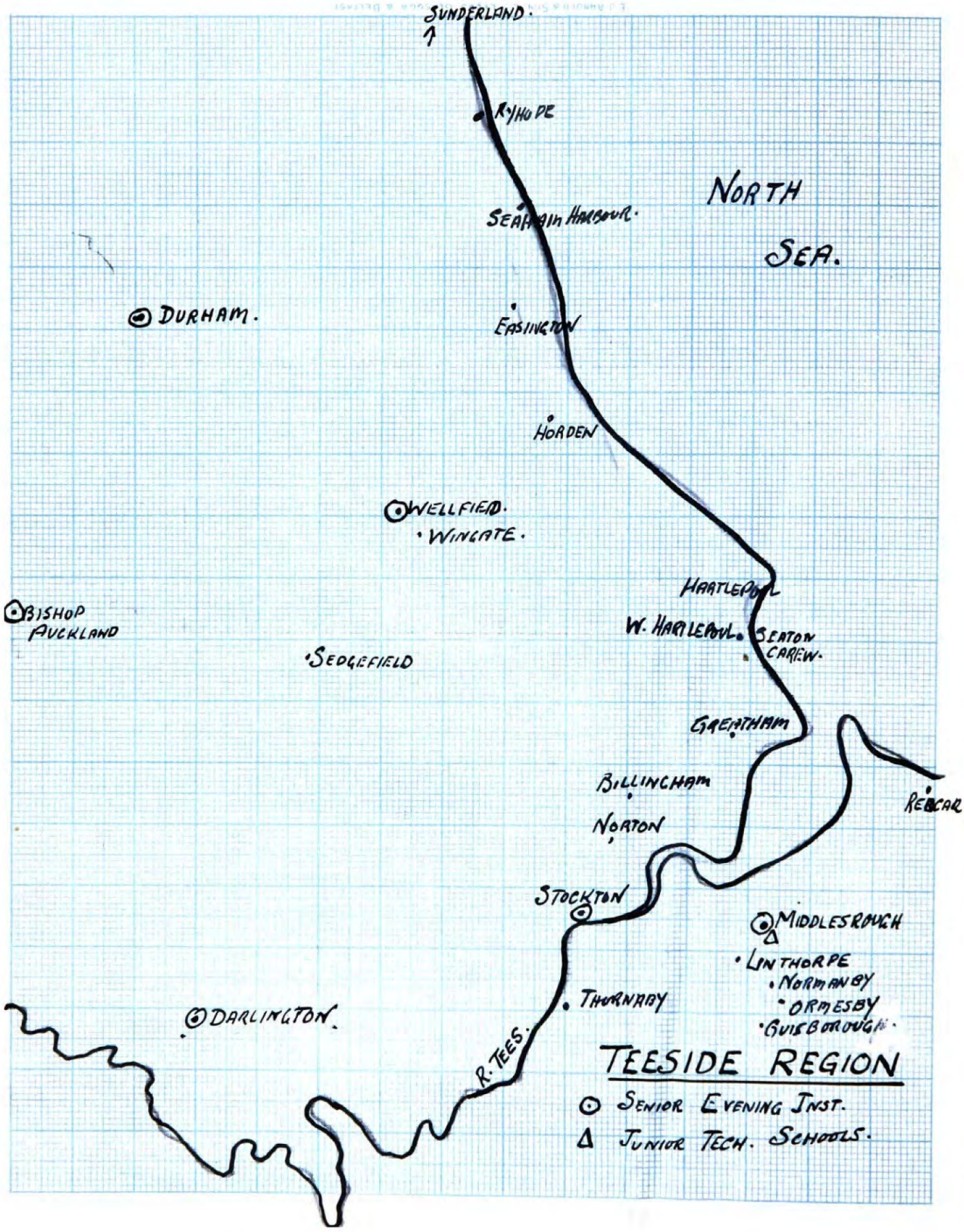
The Elementary School Students bulk more than the Central School Students and this is not easy to understand unless it is evidence of inadequate Secondary and Central and J.T.S.School provision. It is particularly interesting to note that no Central and Elementary School Students have entered the Degree Courses since they were commenced in 1930-31. This is no doubt due to the Matriculation difficulty, and lack of adequate guidance at the School Leaving period.

The following table shews the proportions of the various types of students in various years, the proportions were obtained by dixingxkhs dividing the total number of Students by ten and giving the dividend to the nearest whole number:-

Composition of Degree and Diploma Day Courses.

	1930-31.	1931-32.	1932-33.	1933.34.	Total Proportion.
J.T.S.	3	5	3	2	13
Secondary	2	3	3	2	10
Central & Elementary	1	1	1	1	4

Over a period of four years the J.T.S.Students are most numerous, the Secondary Students come next and the Elementary are least numerous.


SUNDERLAND.
RYHOPE
SEAHAM HARBOUR.
NORTH SEA.
DURHAM.
EASINGTON
HORDEN
WELLFIELD.
WINGATE.
HARTLEPOOL
W. HARTLEPOOL.
SEATON CAREW.
BISHOP AUCKLAND
SEDGEFIELD
GREATHAM
BILLINGHAM
NORTON
REDCAR
STOCKTON
MIDDLESBROUGH
LINTHORPE
NORMANBY
ORMESBY
GUISBOROUGH.
THORNABY
DARLINGTON.
R. TEES.
TEESIDE REGION
⊙ SENIOR EVENING INST.
Δ JUNIOR TECH. SCHOOLS.

EXISTING FACILITIES FOR TECHNICAL EDUCATION ON THE NORTH EAST COAST.

TEESSIDE REGION.

REGIONAL ORGANIZATION OF TECHNICAL EDUCATION.

The Constantine Technical College at Middlesbrough has become the Central Technical College of this Region which includes part of North Yorkshire and South Durham surrounding the Tees Estuary. It is a new College and is an outstanding example of how a modern technical institution is organized to provide a great variety of courses to suit all types of students and conditions. There are no less than 331 different part-time and evening classes provided here exluding the full time day courses.

This College provides a marked contrast to the Sunderland Technical College in that practically all of the provision of Technical Education, Art, Commerce and Crafts are found organised in one building; whereas at Sunderland the limited accommodation of the College has resulted ina breaking up of the whole scheme into Major, Minor, Arts and Crafts Courses and Commercial Courses, etc. in different buildings. It would appear that certain ecanomies can be effected when the whole syst m is organized as one unit, and that a truer sense of values would be maintained between all types of students than in the case when the courses are segregated into separate buildings and certain snobberies and inferiorities are experienced by the various departments and studants. Some attempt has been made in this College to develop a "Corporate spirit" among the students by means of a Guild Society, and a canteen is provided for all students and is particularly useful to those who have to travel to the centre.

In the past the segregation of the Major and Minor Courses has often led to the top heavy development of the Major courses at the expense of the Minor Courses. There now

appears to be a movement towards the development of Minor Courses in a great variety of trades and processes to provide workers in industry with a means of adjusting themselves to technical changes in industry. It is becoming evident that under modern conditions of industry, a great number of the operatives who find vertical mobility practically impossible, will not require any degree of advanced technical instruction in scientific principles; but rather instruction in a variety of trade processes so developing their horizontal mobility and adaptability to technical changes.

The College is organised with Departments in the following subjects:-

Naval Architecture
Metallurgy
Pure Science
Building and Allied Trades
Commerce
Arts and Crafts
Engineering

There are additional special classes not organised as Departments.

Capitation and Travelling.

Capitation Fees are not charged against students from outside the Borough unless they fail to produce a permit from their local Education Authority.

Students from the North Riding of Yorkshire and from West Hartlepool Borough are admitted without Capitation Fees and they only require a note of permission to attend.

Durham County Education Authority pay Capitation Fees for County students attending the College.

The Capitation Fee is less for Evening and Part-Time courses than for Full-Time Day Courses.

Travelling.

The degree to which this College provides facilities for students outside the Borough may be gauged from a consideration of the following statistics of travelling (provided by the Principal).

Session 1933-34. (Evening Courses Only).

Students from outside Middlesbrough	=	448
" " Middlesbrough	=	960
Total of All Evening Students.		1408.

$\frac{448}{1408} \times 100 = 31.36\%$

Therefore 31% of all Evening Students attending the Constantine College reside outside of Middlesbrough.

Travelling expenses are paid by Durham County to all of their approved students attending this Centre, other Authorities either do not pay or only partly pay such expenses.

The Student Composition of the College.

In order to determine the degree to which the College is being served by various types of Schools an analysis of enrolment forms was made for Evening Courses only and the result was as follows:- (Figures supplied by the Principal).

Session 1933-34 (Evening Courses Only.)

	Number.	Proportion.
Leavers from Secondary Schools	573	6
" " Elementary "	395	4
" " Central "	274	3
" " J.T.S. "	119	1
" " University Graduates ..	20	-
" " Others	27	
Total Students attending Evening Courses	1408.	

This analysis can not be compared with that for other Technical Colleges in the area as this College provides education over a range of Major and Minor Courses for Industry, Commerce, Art and the Profession, outside of the present scope of the older Technical Colleges which are unable to accommodate such a variety of Courses. The older Colleges have been forced to expand either by de-centralizing, that is transferring certain courses to other local Technical Institutes, or by leaving certain courses to be provided elsewhere and concentrating on the development of others.

The present number composition of the various types of courses provided are as follows:- (Figures supplied by the Principal)

Session 1933-34.	Students.
Full Time Day Courses	30
Part Time Day & Evening Courses	110
Evening Courses Only	1408
Total number of students attending the Constantine College	1548.

FULL TIME DAY COURSES.

A limited number of students attend these courses for London Degree work in Engineering, Pure Science and Metallurgy. A two year Diploma Course in Foundry Technology is also available for students wishing to train for Technical Posts in the Metallurgical Industries.

Matriculation classes are provided for those preparing for Degree work.

Courses Recognised for National Certificates.

These Courses represent the most important type of education for industry and are available to the Part-Time and Evening students, who usually take a period of five years to cover the courses.

Ordinary and Higher National Certificates.

Mechanical Engineering and Electrical Engineering.

Ordinary National Certificates.

Naval Architecture, Building Constructions and Chemistry.

PART TIME DAY AND EVENING COURSES.

These courses have been chiefly arranged for Works Apprentices, and about 80 of them attend for three periods a week of which one period at least is during the day time. These apprentices are selected by their employers mainly on their previous educational record, the T3 examination is usually taken as a satisfactory gauge of their ability.

The following Major Courses are available to

students who attend under this scheme, and National Certificates may be taken in those courses recognised for such (see list on previous page).

Mechanical Engineering
Structural "
Naval Architexture.
Electrical Engineering
Marine "

In addition to these Major Courses there is provision for Minor Courses for apprentices who are more concerned with becoming efficient workmen than of rising to administrative positions.

Minor Courses.

Mechanical Workshop Course.
Template Workers "
Welders Course
Motor Mechanics Course

Art classes are also organised on the Part-Time Day and Evening basis and about 30 students attend afternoon classes but the majority attend in the evening.

EVENING COURSES.

Major Courses.

Evening Grouped Courses are provided in all Departments recognised for National Certificates (see previous list) and also in those subjects provided for the Part-Time Day Apprentices (see above list).

London Degree Courses are available in Metallurgy, Science, Chemistry, Physics and Engineering. Matriculation classes are also arranged over a range of subjects. Metallurgical classes are provided in Chemical Metallurgy, Engineering Metallurgy and Coke Oven Management.

There are also preliminary Major Courses of Civil Engineering, Architecture, Pharmaceutical Chemistry and courses for Sanitary Inspectors Certificates. The Architecture course leads to the intermediate examination for the R.I.B.A. The Pharmaceutical classes lead to the Preliminary Scientific examination, and further instruction is therefore necessary in order to obtain the final certfficate (This may be obtained at Sunderland).

The Department of Commerce is organised to provide General Courses of Commercial Education, Professional Courses preparing for Intermediate examinations of Professional Societies and Courses for Retail Traders.

The Arts and Crafts Department provides Industrial, Professional, General and Teachers Training Courses suitable for various professional and other examinations (details in Prospectus). The Crafts provided are, with the exception of the Decorators Course, non-vocational and in this respect the organisation bears a marked contrast to that of the Sunderland Arts School where vocational Craft instruction is well developed.

Minor Courses.

Evening Minor Courses are provided in subjects taken by the Part-Time Day Apprentices (see list) and the General and Retail and Commercial Courses also fall into this category beside some of the Arts and Crafts Courses. There are in addition Woodworking, Plumbing, Foundry Technology, Coke Oven Management and Industrial Chemistry Courses.

ADAPTABILITY OF THE TECHNICAL PROVISION TO TECHNICAL CHANGES IN INDUSTRY.

Although no generalisation can be made yet it appears that this College has tackled the problem of adjusting technical education to the variations shewn by industry in providing separate courses to deal with these variations as they occur. Higher courses dealing with the scientific principles underlying certain industries are provided for those who are likely to occupy the higher ranks of industry, but increasing attention is being given to special courses adapted to particular operations or sub divisions of industrial processes. Dr.T.J. Murray, Principal of the College, has schemes in hand for extending the facilities for Minor Courses.

STOCKTON TECHNICAL INSTITUTE.

This Institute is the only one of its kind in Stockton and is organised in a building used in the day by the local Secondary School.

Major Courses.

National Certificate courses are provided in Mechanical Engineering, and in addition there are Major Courses in the following subjects, suitable for Northern Counties examinations:-

Electrical Engineering ..... T3 - T4 years.
Building Construction ..... T3 - T4 "
Industrial Chemistry ,..... T3 - T5 "

Post National Certificate Courses are arranged in Mechanical Engineering, Structural Engineering and Structural Design. These Courses are suitable for those preparing for professional examinations such as the A.M.I.M.E. or A.M.I. Struct.E. or City and Guilds of London examinations.

London Intermediate Degree Courses are provided in Science and Engineering and Matriculation classes are available for intending Degree students.

Minor Courses.

Provision is made for the following Minor Courses and in addition there are special subjects for adults:-

Painting and Decorating
Plumbing
Typography
Commercial Courses
Metal Constructional Course
Workshop Course
Retail Traders Course
Oxyacetylene Welding
Agriculture.

Continuation Classes.

These classes are held in the same building and are Preparatory Courses of a Junior Technical and Junior Commercial nature, the Northern Counties examination are taken by these students in T1 and T2 years.

Non-Vocational Courses.

These courses are divided into Junior and Senior Classes and the subject matter is of a general cultural value and suitable for adults. Domestic classes are held outside of the Institute.

Travelling.

Durham County students are granted travelling expenses to reach this Centre provided that the distance travelled is more than 2 miles, and that their attendance is atisfactory. Students who wish to attend Institutions outside of the county area must secure a permit from the Durham County Authority, who will only grant such a permit if provision is not made at Centres near which they reside.

Regional Relationships

It is obvious that in all Major Courses excepting Mechanical Engineering that this Centre must send its students on to some other Central Technical College which provides more advanced instruction. The Middlesbrough Constantine College is the nearest Centre for Stockton students.

WEST HARTLEPOOL TECHNICAL COLLEGE (EVENING COURSES).

All of the Technical Education provided here is by means of Evening Courses and there is a Continuation School held at Elwick Road Evening Institute, which prepares ex-elementary students for the Senior Courses by means of a two year course with a Technical, Commercial or Domestic bias (T1 and T2.)

The Technical College offers Evening Grouped Courses in the following subjects:-

Major Courses.

Mechanical Engineering
Electrical "
Naval Architecture
Building Construction
Pure and Applied Science (including Industrial Chemistry
Matriculation
Commerce

Minor Courses.

Plumbing and Sanitary Work
Bakery.

Major Courses.

Ordinary and Higher National Certificate Courses are offered in Mechanical Engineering, and in addition there is provision for those students who desire to study for the professional qualification of A.M.I.Mech.E.

Third and Fourth Year Senior Courses are provided in Electrical Engineering, Naval Architecture and Building Construction. A Chemical Industries Senior Group Coursax T5 - T5 is arranged for Norrthern Counties Examinations and in addition there are general courses in Physics and Chemistry.

Professional Commercial Courses and Senior General Courses are organised to meet the demands of Professional Examinations and other Commercial Examinations.

Special lectures on Engineering Research are very popular at this College and are free to all interested.

Minor Courses.

Plumbing Courses covering the requirements of Northern Counties Examinations and City and Guilds of London are available. Bakery Courses are also organised either for those employed in the trade or for those who wish to enter the trade.

Capitation and Travelling.

No Capitation Fees are levied between old Hartlepool and West Hartlepool (W.Hartlepool is in the county of Durham). No Fees are charged against Durham County students, and the County Authority pays the travelling expenses of students using this Centre.

A small number of students from this College proceed to the Constantine College (about ten), but the majority of students who desire further advanced education travel to Sunderland Technical College which is nearer than the Constantine College.

An analysis of the Composition of the Courses and the numbers of students travelling to this Centre is given below; (figures supplied by the Principal) :-

Numbers of Students Enrolled.

Engineering	163
Commerce	79
Building	18
Plumbing	25
Miscellaneous (Matric. Science etc.)	47
Total students attending Evening Courses	332.

Travelling.

Students from Old Hartlepool ..	41
" " County	12
Total students travelling	53

$\frac{53}{332} \times 100 = 1.59\%$

This College is chiefly concerned with the provision of Technical Education for Local requirements and is only providing education for those outside of the Borough to the extent of about 2%.

DURHAM COUNTY PROVISION OF TECHNICAL EDUCATION.

The organisation of the provision of technical education in Durham County is very much similar to that of Northumberland County (already described). The Director of Education for Durham County Education Authority kindly supplied the writer with a complete set of prospectuses, covering all of the provision of technical education in the County of Durham. After analysing this considerable amount of information, the writer was able to classify the courses of instruction and summarise the facilities as follows:-

The Technical Instruction provided in Durham County Evening Classes is based on the Syllabuses of the Northern Counties Technical Examinations Council. There are Junior Continuation Courses of two years duration which prepare Ex-Elementary students for Senior Courses usually of three years duration; and in addition there are Advanced Courses or Special Subject Courses of an advanced nature provided at particular centres only.

The County is divided into 14 districts for administrative purposes and separate prospectuses for the provision of Evening Classes are available for each district. In addition certain Senior and Advanced Centres issue special prospectuses dealing with the particular facilities available at such Centres.

There are also a number of Technical Institutes situated in County Boroughs etc. which provide advanced Technical Instruction and these Centres are used by approved Durham County Students who are granted travelling expenses and free Capitation Fees, although they must pay their own class fees if they are unable to win a free place or exhibition usually provided by such Authorities.

In all the County Districts there are Junior Courses of Instruction in Technical and Commercial Subjects (T1-T2), which enable Ex-Elementary boys to prepare for Senior Courses or more advanced instruction.

Senior Grouped Courses of Technical Instruction are provided at least up to T3 standard in all districts except the Crook and Weardale District and the North Eastern District. In the first case this is probably due to the sparse population and the very few industries requiring such provision, in the latter case the District is well supplied with Senior and Advanced Technical Instruction by the Sunderland Borough.

COUNTY DURHAM ADMINISTRATIVE DISTRICTS.

North Eastern, Sedgefield, Darlington and Teesdale, Consett District No.6, Crook and Weardale, Spennymoor, Bishop Auckland, Blaydon, Houghton-le-Spring, Durham District, Easington, Chester-le-Street, West Stanley District, Belling District.

SEPARATE CENTRES (SEPARATE PROSPECTUSES).

Hartlepool, Henry Smith School (Junior Centre), Durham City, Johnston School (Senior and Advanced Centre).

OTHER TECHNICAL CENTRES USED BY COUNTY STUDENTS.

Sunderland Technical College and Villiers Street Technical Institute.

West Hartlepool Technical College.

Gateshead Technical Institute (Held in Secondary School)

Stockton Technical Institute. (" " " ")

Darlington Technical College.

Jarrow Technical Institute (Held in Secondary School).

THE PROVISION OF SENIOR AND ADVANCED COURSES.

There is only one National Certificate Course recognised under the Authority and that is for Building Construction at Durham (Johnston Technical Institute). Preparatio for National Certificate Courses in Mechanical Engineering is given at both Consett and Bishop Auckland, although these courses are not recognised for Certificates.

All other courses of a technical nature are, with certain exception, Senior Courses working to Northern Counties Technical Council Syllabuses.

THE EXCEPTIONAL COURSES.

There are City and Guilds of London Handicraft Courses for teachers provided at Chester-le-Street and Bishop Auckland. Classes for Colliery Deputies are held in most of the important mining districts, and there are also a large number of classes for Boys 14 - 18 years who are given instruction on safety principles in the mines. There are at present 1,400 ø Boys attending such classes in Durham County (1933-34 Session). (ø Figure given by Mr.J.Howatt, President of Durham County Mining Society).

In several centres there are Handicraft courses suitable for Senior Elementary Teachers, but not specially preparing for examinations. There are Pharmacy classes at Bishop Auckland preparing for the Preliminary Scientific Examination. At the Johnston Secondary School, Durham, the following special courses are provided:-

(1) Painters and Decorators.
(2) Sanitary Inspectors.
(3) Matriculation.
(4) London Intermediate Degrees on Arts and Science.
(5) Advanced Building and Mining.
(6) Meat Inspection and Food Hygiene.

At Consett there are senior courses in Steam Engineering, Building, Iron and Steel Manufacture and Coke Oven and Bye-Products.

At Bishop Auckland there are also courses in Plumbing, Building, Coke Oven Bye-Products and Mechanical Engineering.

The following centres have senior courses of Engineering and Mining:-

Chester-le-Street, Wellfield, Durham, Bishop Auckland, Consett, Blaydon, Houghton-le-Spring, West Stanley, Hordon.

Ryton has also Senior Mining and Building Classes.

COMMERCIAL COURSES.

In all district and local centres which cater for Junior Technical Continuation Courses T1 - T2, there is also provision for Junior Commercial Courses T1 - T2. Similarly at most of the Senior Technical Centres there is also provision for Senior and occasionally advanced Commercial courses. More advanced Commercial Classes are available at Durham, Bishop

Auckland, Consett, Seaham Harbour, Houghton-le-Spring, Blaydon, Chester-leeStreet, West Stanley (Shields Row) and Wellfield.

NON-VOCATIONAL COURSES.

At all Junior Technical and Junior Commercial Centres there are also Non-Vocational Courses for students 14 - 18 years. At most centres there is also provision for Adult Non-Vocational Education, this education is either provided by the County Authority or by the women's Institute, or by the Workers Educational Association, or by the University Extension Lecturars.

THE WORKERS EDUCATIONAL ASSOCIATION.

The subject matter of the special adult courses is chiefly composed of Literature, Economics, History, Local Government or Dramatic Art.

THE WOMENS INSTITUTE.

In most of the Local Centres in Durham County the Womenis Institute provides courses of either Dressmaking, Embroidery, Homecrafts, Country Dancing, Dramatic Art, or Domestic Subjects.

UNIVERSITY EXTENSION LECTURES.

These lectures are given as Short Courses and are chiefly concerned with Literature, Economics, and History. There are only a few centres used for these lectures.

THE GENERAL COMPOSITION OF EVENING CLASSES PROVIDED IN DURHAM COUNTY.

Excluding the Senior and Advanced Centres the following is a list of the type of courses provided at most of the local and District Centres:-

(1) Junior Technical and Commercial Courses T1-2.

(2) Junior Non-Vocational Courses.

(3) Adult Non-Vocational Courses provided by either or all of the following:-
   (a) Workers Educational Association.
   (b) Women's Institute.
   (c) County Council.

(4) Special Subject Courses such as Domestic Work, Handicrafts, Deputies and Firemen's Certificate Courses in Mining.

(5) Classes for Colliery boys in the Safety Principles of Mining (in Mining Districts Only).

DARLINGTON TECHNICAL COLLEGE.

This college is a Central Technical College for an industrial area; the chief instruction is given in Evening Courses but there is also a Part Time Day Course with supplementary evening attendance for privileged apprentice engineers who are able to attend and others who wish to study for professional Civil and Mechanical engineering examinations. This is organised in a two year basis with attendance on one day a week from September to June.

The College Evening Courses are recognised for Ordinary and Higher National Certificates in Mechanical Engineering only, and students may also prepare for professional engineering examinations. The following Evening Classes are organised in the following Departments and Courses:-

Departments.

(a)	Technical.	Engineering, Pure Science, Building Trades.
(b)	Commercial.	General Commercial and Professional Courses
(c)	Domestic.	Special Subjects.
(d)	Art.	Junior Art, General Art, Industrial Art, Fine Arts, Painters and Decorators, Wood Carving. Architects Part Time Day Course for Probationery and Student examination of the Institute of British Architects.

BRANCH TECHNICAL SCHOOLS IN DARLINGTON.

Technical and Commercial Evening Continuation Schools are provided outside of the College in outlying schools; they are of a preparatory nature and are chiefly intended for Elementary school boys.

There was once a Junior Technical School held during the day on the premises of the Technical College but this was abandoned when the age was lowered to 11+ years.

JARROW EVENING TECHNICAL INSTITUTE (Held in the Secondary School.

This Institute is of a Senior and Advanced nature and is used by certain County students in addition to those from the Borough. There are the following types of courses available:-

(a) Junior Technical and Commercial Courses T1 - T2.

(b) Senior Technical and Commercial " T3 - 4 -5

(c) Handicraft Classes for City and Guilds of London.

(d) Art Classes of a general nature, and special subjects such as Dressmaking, French, Physical Training, etc.

The Senior Technical Courses are sub-divided into Mechanical and Electrical Group Courses, and Northern Counties examinations are taken by the students.

Certain Engineering firms in the district encourage the attendance of their apprentices at these classes by bonus schemes and by refunding their class fees under certain conditions.

D I V I S I ON IV

CHAPTER 11.

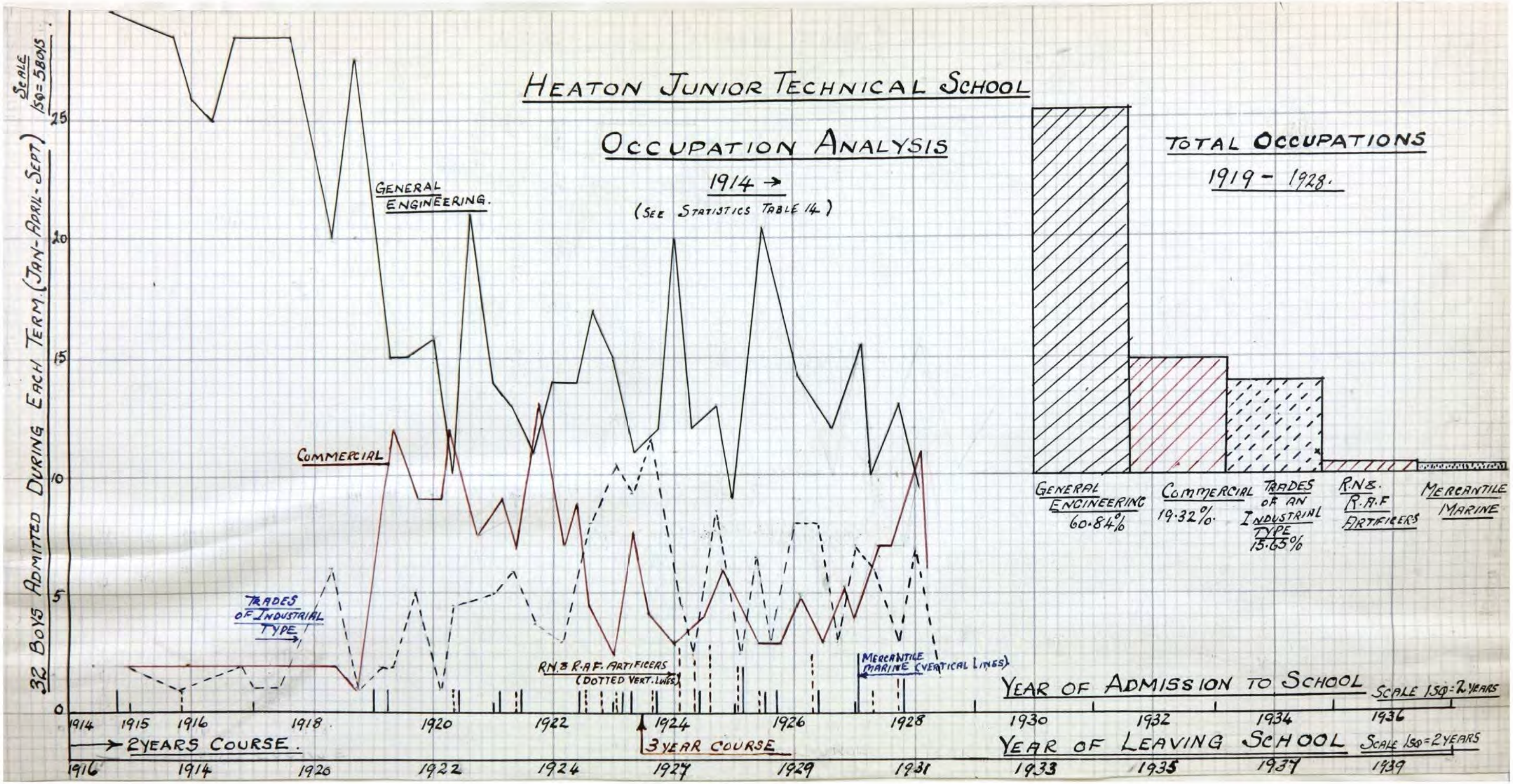
Vocational Guidance.

HEATON JUNIOR TECHNICAL SCHOOL

OCCUPATION ANALYSIS

1914 →

(SEE STATISTICS TABLE 14)



TOTAL OCCUPATIONS

1919 - 1928.

SCHOOL OCCUPATION ANALYSIS.

In all forms of Post Primary Schools and particularly those in an industrial area, it is desirable to have some means of adjusting the curricula of the schools to Technical Changes in Industry. Unless such a means of adjustment exists then the School may be preparing its students for occupations which no longer exist, and the student will be forced to attend Evening Classes or other Part-Time Courses while working at some blind alley occupation in order to get a grounding of Technical Education which will assist his advancement in Industry.

GRAPHICAL ANALYSIS.

A graphical method of school occupation analysis was devised by the writer which would reveal the proportions of the characteristic occupations taken up by school leavers, from any type of school. The Heaton Junior Technical School was selected for this purpose, as it was the oldest Junior Technical School on the North East coast, and its records covered the Great War period (Founded 1914).

The occupations of students were analysed from admission registers and record cards and then the occupations were classified according to the Nomenclature arranged (see Appendix 1 for Nomenclature and Appendix - for Statistics).

The information was plotted to the year of admission, and by adjusting the scales the year of leaving occurred at the same distance along as the year of admission$^{\emptyset}$ (See Chart) Thus reading from the chart in September 1924 a Form would be admitted and would leave in 1927 (see leaving scales on next page).

Now reading from the ordinate where it intersects the various graphs we find that these boys took up the following occupations:-

Occupational Sample Reading (Sept.1924).

General Engineering	13	
Commercial	6	
Trades of Industrial Type	9	
R.N.& R.A.F.Artificers	3	
Not traced or left before end of course	1	ø
	32	

ø This number is given in the statistics, Appendix ( ) It can also be obtained by subtraction, as there are 32 boys per form.

The usefulness of this method of representation lies in the fact that a complete picture of each Form is preserved, from entering the school to obtaining employment. It is also clear that actual numbers are given and that the sum of the ordinates of all graphs on any vertical line represent one Form of 32 boys.

General Engineering.

From 1914-1918 there was an overwhelming demand for Engineering apprentices as far as 30 out of 32 boys in each form went into engineering. At the end of the war there came a slump in engineering and there is now an average of about 14 boys entering engineering out of every form of 32. The wavy appearance of the curve from 1919-1932 indicates that the summer term is the peak term in each year for entry into engineering. This is in accordance with actual experience in the engineering industry for the summer is always a busier time than the winter in all works. A fact which is not so obvious can be found by plotting the General Engineering curve on a smaller abscissa scale By doing this the waviness disappears and a smooth curve very slightly inclined downwards results.

This reveals that since 1919 the average entry into engineering has been slowly declining every year and thus no sudden increase in employment in the engineering industries can be hoped for nor can the school ever hope to supply the proportions it did during the war years.

Commercial.

This curve indicates that employment in commerce is inversely proportional to that in engineering. For whenever there is a slump in engineering the commerce curve rises sharply to make good the loss. Immediately after the war there was a tendency for the boys to take up commercial work but this tendency is now definitely less than during that disturbed period. At present there is a slight rise in commercial occupations and it reflects upon the stagnation of many of the heavy industries which the boys would otherwise go to.

Trades of an Industrial Type.

Employment in these trades varies directly as in General Engineering but to a lesser extent. Between 1922-1924 there was a boom in the Building trades and this accounts for the apparent irregularity in the curve. One important conclusion is arrived at from this, that when there is a slump in engineering there will also be a slump in trades of industria

type and thus boys seeking employment will naturally turn to commercial occupations.

R.N. & R.A.F. Artificers.

There is an increase in the frequency of boys passing into these trades and in the future it is possible that this frequency will continue to increase, a very desirable thing to expect.

Mercantile Marine.

The Mercantile Marine does not appear to command much attention from the boys, but there is a distinct increase in the frequency of boys going into the merchant services.

The Further Technical Education of Leavers.

Although the foregoing Dynamic Survey of School Employment reveals the actual numbers entering certain occupations, yet without some knowledge of the success of the students in these occupations for which the school is specifically preparing it would be difficult to decide whether the school was supplying low grade or high grade recruits to the Engineering trades.

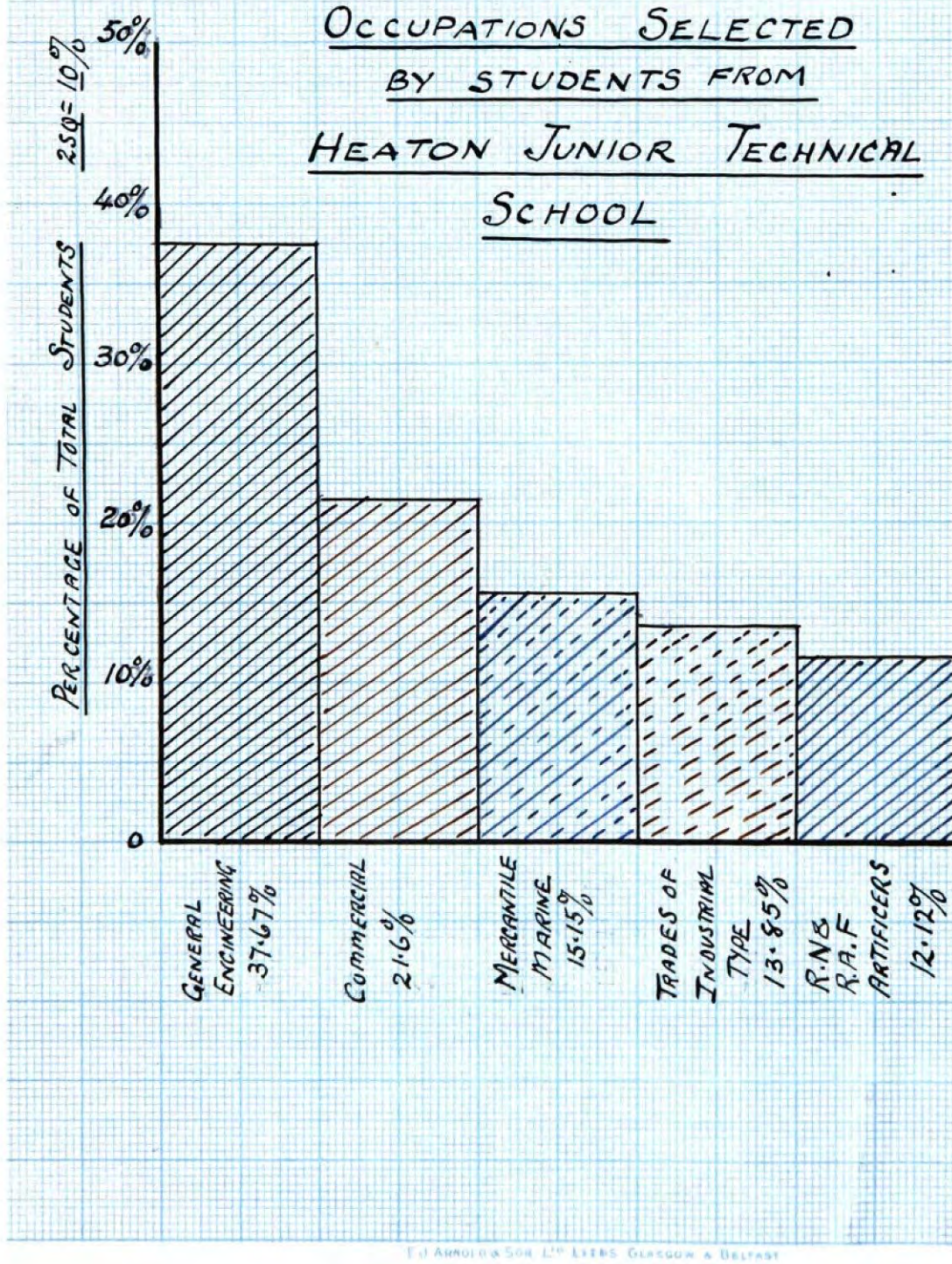
For this reason it is necessary to consider the analysis of the composition of Higher Evening Classes in Major Courses of Technical Work, for the particular area in which the school is situated. This has already been discussed under the ~~xikai~~ title "The Composition of Higher Technical Classes in the Area" (P), and it will be noticed that in the Tyneside Region the leavers from two small Junior Technical Schools supply more students to Major Courses of Technical work than all other types of schools in a very heavily populated region.

Occupations Selected by Students.

It was thought that an investigation of occupations selected by students while at school would reveal whether the characteristic employment obtained on leaving corresponded with the actual desired employment of the students while at school.

Precautions. At the Heaton Junior Technical School the enquiry was conducted with great care and the nomenclature of the Occupation Grouping was explained in detail. Afterwards each student was granted a private interview in which he was given any vocational advice which would assist him to select the career which he considered himself best suited for. The students were then asked to mention this matter to their parents

Occupations Selected by Students from Heaton Junior Technical School



E.J. Arnold & Son Ltd. Leeds Glasgow & Belfast

and on the following day slips of paper were provided and the students were asked to write their choice of career, no signatures were asked for. Particular care was taken to give impartial advice on Commercial Occupations, and to rid the enquiry of "mob effects" in selection and of "engineering snobbery" in their individual choice.

HEATON JUNIOR TECHINCAL SCHOOL.

Occupations Selected by Students.	%
General Engineering	37.67%
Commercial Work	21.21
Mercantile Marine	15.15
Trades of Industrial Type	13.85
R.N.& R.A.F.Artificers	12.12
	100.0.

Note:- 231 Students present were questioned.

Analysis of Actual Occupations of Leavers. (1919-1932) (Excluding the War Period).	
General Engineering	51.0%
Commercial Work	24.6
Trades of Industrial Type	19.1
R.N.& R.A.F.Artificers	2.9
Mercantile Marine	2.4
	100.0 (Excluding not traced and left school).

This comparison is certainly of interest and if the subdivisions of the Industrial Occupations are added the following result is obtained:-

	Selected.	Actually Employed.
Industry	78.79%	75.4%
Commerce	21.21%	24.6%

This comparison suggests that a small average of about 4% of the students who are unable to get placed in Industry take up Commercial Occupations. But about 20% of the students who enter Commercial Occupations deliberately chose such an occupation (with the help of their parents) while at school.

Evidence of the consistent proportion of occupational choice exercised by the students in all Forms of the school may be seen by reference to the detailed statistics collected for the analysis.

of the school may be seen by references to the detailed statistics collected for the analysis.

Occupations selected by the Students - Heaton J.T.S.

Occupations.	J1.	J2.	J3.	M1.	M2.	M3.	S1.	S2.	S3.	Totals	%
General Engineering.	11	13	10	9	9	9	8	5	13	87	37.67
Commercial Work.	5	4	4	2	8	7	5	10	4	49	21.21
Mercantile Marine	2	2	4	8	5	4	6	1	3	35	15.15
Trades of Industrial Type.	5	6	6	4	5	1	1	1	3	32	13.85
R.N.& R.A.F. Artificers.	4	4	2	6	2	1	3	4	2	28	12.12
										231	100.0%

The consistency of the 20% who wish to enter commerce even in the lowest form in the school, suggests that a definite number of boys are entering Junior Technical Schools with no intention of entering industrial employment.

Interview. H.M.I.MR.A.H.STELFOX. He said that he did not mind Junior Technical School boys entering commerce, if only they entered the school with the intention of becoming engineers. He thought that their training would then have a special value to them in commerce.

Transfer Schemes.

As it would be quite impossible to provide commercial training in a Junior Technical School for the 20% of students who entered such occupations, they consideration of Transfer Schemes becomes important.

There would obviously be great economy in teaching, and in engrgy spent by the students in learning something of no vocational use to them if it were possible to transfer these students into a school or course better suited to their educational requirements. The Hadow Report definitely regards all Post Primary education as a single whole yet having a variety of alternative courses all developed with a common aim.ø

Without Transfer Schemes between all forms of Post Primary schools such a unity of organisation would be impossible, instead the student would be restricted to a particular type of education on the result of a written examination at the early age of 11 years, regardless of any other special ability which may develop later.

Extract.

"Primary education should be regarded as ending about 11+ years. A second stage should then begin, and this stage, which for many pupils would end at 16+, for some at 18 or 19, but for the majority at 14+ or 15+, should, as far as possible, be regarded as a single whole, within which there will be a variety of types of education, but which will generally be controlled by the common aim of providing for the needs of the children who are entering an passing through the stage of adolescence."
("The Education of the Adolescent." Page 173.Conc.No.3.)

There can be no doubt that many who attend Secondary Schools would benefit to a greater extent if they were transferred to Junior Technical Schools and similarly about 20% of Junior Technical School boys could be to their advantage transferred either to Secondary or Central Schools. No examination should ~~khsm~~ be necessary for this transfer, it could be done on an equal exchange basis.

At Sunderland ax system is in operation which is at least an attempt to solve this problem although not completely. As the vacancies occur in the local Secondary School owing to withdrawals of students while in the Junior of Middle forms of the school, suitable boys are recommended by the Junior Technical School and Central Schools to fill these vacancies. The vacancies in the two latter types of schools are then filled either by transfer of Central to J.T.S. or by transfer from Senior Elementary to either J.T.S.or Central. As both Central and J.T.S. Schools have French in their curricula the students transferred are under no langauge handicap.

VOCATIONAL GUIDANCE.

Vocational guidance is a means of assisting persons to find an occupation for which they have an innate ability. This guidance can only be given after a scientific study of the industrial prospects of the area and after something is known of the mental capacity and physical aptitudes of the person seeking guidance.

Existing Methods of Vocational Guidance in Use in the Area.

Local Juvenile Advisory Committees.

These Committees have already been referred to in the chapter on "Juvenile Unemployment", and the work of these Committees is controlled by the Secretary who is also the responsible officer in charge of the Ministry of Labour Department.

An analysis of the "Report on the Work of Local Committees for Juvenile Employment during 1932" reveals that their work is chiefly directed to the following problems:-

(1) Local Occupational Surveys and Works Visits.
(2) Classification of Juveniles according to Degree of "Employability" and the Maintenance of an Appointments Agency for Juveniles.
(3) Vocational Advice to Juveniles, and Placing in Employment of a limited number of Juveniles.
(4) Supervision of Employed Juveniles.

The Juveniles are classified in employability on the result of an interview to which their parents are also invited to attend, the chief factors considered are Medical Fitness, Previous Educational Record, Home Circumstances, and General Personality, etc., and special Abilities.

Some Local Committees prefer the Juveniles to attend an "Advisory Rota" that is to pay regular voluntary visits to the Bureau for the purpose of advice, other Committees prefer the "School Conference" which ensures that a larger number of Juveniles benefit from such advice than is usual with the Advisory Rota. Of the two methods of interviewing and imparting advice, the School Conference is preferable as there is less stigma attached to this than is occasioned by a visit to the Exchange Buildings.

The methods of giving information are varied and the

following are examples of how certain Local Committees have tackled the problem:-

> By Means of Pamphlets,on the Change from School Life to Work, Local Employment and Facilities for further Education. Handbooks of Occupations in detail and periodic bulletins on Careers. Mass Meetings of Children addressed by Members of the Committee. Parents Advisory Meetings. Cinematograph Films of Local Industries or Occupations. Works visits by the Children.

A serious of bulletins is also issued by the Ministry of Labour in conjunction with the Headmasters and Headmistresses Association on "The Choice of a Career" which provides suitable information particularly suited to Secondary and Junior Technical School students.

Vocational Guidance by Schools in the Area.

The Secondary Schools in the area provide a form of vocational guidance specially "biased" in favour of the teaching profession, as the Board of Education accepts the qualifications usually obtained by such students when selecting candidates for the teaching profession.

The Junior Technical Schools in the area have made the most successful attempts at vocational guidance, this success is chiefly due to the particular qualifications and works experience of the staffs of such schools. From first entering such a school the boy is presented with a picture of all industrial processes in that Region and his knowledge of industry is widened by works visits and by lectures on certain technical subjects. In his last year at the school the boy is continually urged to consider his future occupation and is given individual advice by members of the staff on how to obtain his first job.

The Headmaster is very frequently able to place more than 50% of the boys in employment, chiefly because the schools are very closely connected with industry and employers send to the school for a regular supply of apprentices.

A certain amount of vocational guidance is undertaken by the Professors of various faculties at Armstrong College, and in certain cases the Professor is able to place one of his students. Very little is done in the Technical Colleges of the area in this respect.

It is noteworthy that certain Public Schools (outside of the area) have appointed "Careers Masters" who ARE ~~is~~ to give vocational guidance to students.

The North East Coast Institution have on several occasions issued vocational advice to those about to enter the Engineering Industry, and their scheme of technical instruction for engineers has been adopted by the Sunderland Technical College and is briefl as follows:- (from the Prospectus).

A. Boys from Secondary Schools.

Students should matriculate at 16 years and proceed then to the works as an apprentice, from 16 to 18 years he will attend the Senior Day Course half time in the works and half time at college. From 18 - 21 he will attend the Advanced Day Course (half time) and study for his Degree or Professional Certificate.

B. Boys from Elementary Schools.

Boys from Elementary Schools should be drafted at 12 years to Junior Technical Schools for a three years course, they will then follow a similar route to the Secondary School boys and if they have Matriculated they will take similar examinations otherwise they will take a College Diploma.

Note. At present there is no Senior Day Course. Students must attend Evening Classes instead.

The North East Coast Institution have also issued a publication on "Engineering Training for Officers Rank", (N.E.C.Transactions Vol.46.1929) in this report there were two items of particular interest; one dealt with the character and temperament of the type of "privilege recruit" whom they considered a most likely to succeed in industrial management, and the other item of interest revealed the present state of apprenticeship available to the "Non-privileged apprentice".

The first item is as follows:-

"He is essentially a man of action and his scholarship is only of full advantage to him if it does not lessen his capacity for making up his mind and for learning from experience".

The other item is as follows:-

"The allotment of the employment of a pupil of the type under consideration should never be left to the uncontrolled discretion of a foreman, chief draughtsman or minor official, immediately responsible for obtaining the greatest possible output from his department at the smallest cost. If this is allowed the

pupil will inevitably be treated as an ordinary apprentices, and will be kept in some simple and repetition employment in which his output will be a contribution to the output of the department, but the instructional value of which may be very small".

Suggested Methods of Vocational Guidance.

For Elementary School Pupils.

The present Local Juvenile Advisory Committees are competent to deal with this problem and school conferences would appear to be superior to other means of giving individual advise. Transfer scheme between all forms of Post Primary education would be an essential part of such guidance, and the chapter on School and Employment is suggested as a useful source of information for the guidance of Elementary Schoolboys intending to continue their education in some other Post Primary School. Much could be done within the school to impart a vocational advice and the methods adopted by the Juvenile Advisory Committees are to be recommended for this purpose.

For Secondary and Junior Technical School Students, and Other Post Primary Schools.

It would appear that Juveniles who have received a more advanced education up to about 16 years, will r equire very special vocational guidance if they are to make anything of their better training, and the schools cannot shirk their responsibiliti in this matter.

A scientific survey of the modern tendencies in the industrial position of the area is of first importance in order to give this guidance, the type of survey suggested is of the nature of that attempted in the early chapters of this Thesis. A mere industrial handbook of the various occupations in the area is of little use, and could not be used either by advisers or students. In addition many of the "Bulletins" and "Choice of Career Series" are unsuitable for Juveniles in this particular area, since they are only of use where special facilities are available to the students.

The survey of the industrial tendencies must be followed by a most careful enquiry into methods of recruitments and apprentice training existing in industries within the area, an example of such an enquiry is to be found in the chapter on

"Recruitment of Apprentices to Industry", the "Apprentice Permeability of the Industries should then be compared with the industrial prospects in the way suggested in the section on "The Prospects of Apprenticeship on the North East Coast". Then the existing facilities for technical education in the favoured industries should be considered and particular attention should be directed to the Part-Time Day Schemes or Full-Time Day Schemes available.

In some cases there may be no local provision for instruction in the subjects required and in that case a survey of the tehcnical provision in the area with detailed information concerning Regional Organisation would be necessary. A survey of the provision ~~of~~ and Regional Organisation of technical education in the area has been included in this Thesis for such a purpose.

To assist the Regional Organisation Schemes it would be desirable if all Post Primary Schools in the area made an analaysis of the occupations taken up by leavers in the way suggested in the chapter on "School Occupational Analysis". By this means it would be possible to determine the type of vocational guidance required for each type of school, and if necessary suitable alterations in the curricula could be made to bring the "Supply" more in line with the "Demand" of local industries. Or alternatively certain occupational Groups in the schools could be transferred to other types of school more suited to their educational requirements.ø The tendencies revealed in the occupational analysis of any school should be compared with the charts issued in the Ministry of Labour Gazette which shew the trade fluctuations, prices, wages and unemployment tendencies in various industries. This Gazette is issued monthly and special supplements are also available, The writer suggests that a regular comparison of industrial tendencies as revealed by the Ministry of Labour Gazette and the occupational tendencies of each school will enable any headmaster or other person to ~~determine~~ give reliable advice to those about to enter industry.

ø Dr.Merriman of Wallsend Secondary School is also of the opinion that such Regional Transfer should be possible among Secondary School students.

Universities and Technical Colleges.

Much could be done to assist the "non-privileged" type of student to obtain appointments outside the area. Suitable guidance could be given on the means of adjusting his training to some occupation not necessarily that which he has been apprenticed to. The Colleges could arrange for students to have special short periods of works training in different types of connected industries. In fact the Colleges could aim at becoming the organisers of all works training for the students, in this way adequate works experience would be assured all students irrespective of their social class. ø

ø Note. A "Co-operative works college training scheme of the type suggested is in operation at Cincinnati.U.S.A. and in many other American cities. See also U.S.A. Buttetin of Department of Interior 1916 No.37.

Vocational Tests.

Although the considerabien of Phythough the consideration of Physhological Tests for Innate ability is outside of the scope of this Thesis, yet the writer wishes to record that such tests of Innate Ability are successfully used by the National Institute of Industrial Psychology for purposes of vocational guidance. Suchtests usually attempt to gauge:-

(1) Intellectual Capacity, including General Intelligence Special Interest, Educational Attainments and any Special Ability.
(2) Temperament and Character, including Emotional,Social and Moral Qualities.

On the whole employers are sceptical of Mental Measurement as a gauge of Innate Ability and usually rely on the following chief items:-

(1) Medical Fitness, Physique.,etc.
(2) Employability, which includes personality, previous education, previous school record (or College) recommendations by others, social qualities, home circumstances, how the person can express himself, and what the person has done previously including experience.

M E M O R A N D A.

APPENDIX 1.

Nomenclature of Occupations.

APPENDIX 2.

Nomenclature of Various Types of Schools.

APPENDIX 3.

Education for Industry in Other Countries.
France.
Belgium.
Czechoslovakia.
Holland.
Sweden.
United States of America.

APPENDIX 4.

Recommendations on the Provision of Technical Education from Special Reports shewing National Lines of Advance.

APPENDIX 5.

Statistical Tables.

APPENDIX 6.

Classified Bibliography.

M E M O R A N D A.

APPENDIX 1.

NOMENCLATURE OF OCCUPATIONS.

GENERAL ENGINEERING:-	Mechanical, Electrical, Marine, Mining, Civil, Motor and Engineering Drawing Offices.
TRADES OF INDUSTRIAL TYPE:-	Building, Plumbing, Joinery, Instrument Making, Soap Making, Printing, Dental Mechanic, Cabinet Making, Chemist Assistant, Optician.
R.N. & R.A.F.ARTIFICERS:-	Students who have passed examination and are now in the Forces.
MERCANTILE MARINE:-	Sea-going Apprentice Officers (Deck Only).
UNTRACED:-	Students who have left the district and have lost touch with school.
STILL AT SCHOOL AND NOT PLACED.	Students at school, and those who have finished the course and are looking for work.
TOTAL OCCUPATIONS:-	Total number of known jobs obtained by students and used as a basis of 100% for finding the variation in occupations over a period.

APPENDIX 2.

NOMENCLATURE OF TYPES OF SCHOOLS.

ELEMENTARY EDUCATION.

Elementary education is divided into Senior and Junior divisions for those below 11+ and those above 11+ years. There are Junior Mixed Departments for children up to 7 or 8 years, then there are boys and girls separate departments from this age up to 11+ years, an examination is held at 11+ years which is used to select children for various kinds of Post Primary Education. Some are sent to Secondary Schools, others to Junior Technical Schools, others to Central Schools and the remainder to Senior Elementary Schools. Children remain at Senior Elementary Schools until 14 years, the examination for the Junior Technical School is usually held at 13+ years^{ø}, hence all Elementary school children have a further chance of being selected for a different form of Post Primary education.

ø Sunderland J.T.S. entrance examination is held for boys of 12+ years.

HIGHER TOPS.

This term was used to name the higher classes which developed at the top of some Elementary Schools. Its function has now been taken over by the Senior and Central Schools. It is popular in Durham County, increasing attention is paid to practical work in all of these Senior Elementary Schools.

ø Higher Tops are also found in Sweden.

CENTRAL SCHOOLS.

Following the publication of the "Hadow Report" the Central School was evolved to deal adequately with the problem of Post Primary Education for those students who did not pass into Secondary Schools. They were to provide advanced instruction for older children beyond the age of 14 years and practical instruction was to be used as a means of education. There are two types of Central or Modern School.

(a) Selective School.
(b) Non-Selective School.

SELECTIVE CENTRAL SCHOOLS.

These Selective Central Schools draw their students from the Elementary Schools on the result of a Scholarship Examination at 11+ years. These schools generally have three definite departments. (1) Technical. (2) Commercial (3) Domestic. Entering at 11 years a child has a general education of two years which compares with that received at Secondary Schools, and includes French. The child then decides which department to enter for the next two years, and then enters a more or less specialised department. The school uses practical subjects as an educational means, the word "Technical" has been distorted in meaning to cover the aims of the practical education given, which is illustrated from industry. In the same way the Commercial Department does not provide a vocational education, but uses Commercial Subjects as an educational means. In some schools there is in addition an Academic Department which runs exactly parallel to the Secondary School and aims at the School Certificate examination, this Department is usually found where there is inadequate Secondary education provided in that particular Region.

NON-SELECTIVE CENTRAL SCHOOLS.

In Urban and Rural Districts there are Central Schools which take all children over 11+ years irrespective of ability. The school is organised in a similar way to the Selective Central School, but owing to the wide range of attainment of the pupils it is found necessary to divide the school into Major and Minor courses. The Major course includes all pupils normal for their age and the Minor course includes those sub-normal for their age, both of the courses are similar but the Minor course moves more slowly and includes more practical work. These schools are very difficult to organise and their future success is doubtful, a good example of this type of school is provided by the "Shiremoor Central School" in Northumberland County.

SECONDARY SCHOOLS.

(Including Grammar Schools, High Schools, County and Municipal High Schools).

The regulations for Secondary Schools 1905-6 defined Secondary Schools as those which offered to each of their scholars up to and beyond the age of 16 a general education, physical, mental and moral, given through a complete graded course of instruction of wider scope and higher standards than that given in Elementary Schools. The course is four years in duration, and the curriculum has already been

referred to in a chapter on "School and Employment". Public Schools are mostly recognised by the Board of Education as efficient for the provision for Secondary Education. Literary subjects are used as an educational means, but games are an important feature of the training given in these schools. Most of the students become "lieutenants" in industry or commerce on leaving, others enter the professions. These schools are exclusive and their survival is doubtful from financial considerations, apart from any other reasons.

The usual examinations taken at all types of Secondary Schools are as follows:-

The School Certificate Examination.
The Higher School Certificate Examination.

DAY CONTINUATION SCHOOLS.

The education given in these schools is usually of a part-time nature and of an unspecialised and general type for students between 14 and 16 years of age. Some firms provide their own Continuation Schools but these are not likely to become very popular.

JUVENILE EMPLOYMENT CENTRES.

These are definitely Trade Schools giving direct trade training to students of 14 to 18 years, who have been unable to find employment on leaving school. The instruction is largely practical and the training is only suited for the semi-skilled and unskilled trades. The trade Unions prevent the entry of these boys into the skilled trades as they have not served a recognised apprenticeship.

ADULT TRAINING CENTRES.

These centres are for unemployed men and youths of 18 - 25 years, these courses are now voluntary although originally they were intended to be compulsory for all unemployed men. It was found that after training at these centres no guarantee of employment could be given hence they have become voluntary. The skilled trades will not accept these workers, and their only openings are for jobs in the unskilled or semi-skilled trades.

JUNIOR EVENING INSTITUTES. (Evening Continuation Schools)

These Institutes have replaced the Day Continuation Schools to a large extent, and are attended by boys and girls of 14 to 16 years, a general education is given which enables the student to prepare for Senior Technical Classes after a two years' course. The subjects of the course are English, Mathematics, Drawing and Science or Manual Instruction.

TRADE SCHOOLS.

The time spent in a Trade School is usually reckoned as apprenticeship in Industry, and workshop practice occupies a large part of the time spent in these schools. The Trade Schools are practically unknown in the provinces, they are chiefly found in London, the nearest approach to these schools in the provinces are the Juvenile Employment Centres. The students in these schools are largely taken from Senior Elementary Schools and they are given instruction suitable for entry into certain trades.

JUNIOR TECHNICAL SCHOOLS.

Detailed information about these schools has been given in other parts of this Thesis, it is only necessary to mention that these schools give a training in the Scientific Principles underlying the chief industries, and they are suitable means of training those who will be responsible for production in a works. In some cases Engineering Schools of this type have become a means of supplying the higher ranks of the Engineering profession. They are all of a selective type, and take students at 13+ years or 12+ years.

TECHNICAL COLLEGES AND SCHOOLS.

The classification of the Higher Technical Courses given in these Institutions has already been referred to. These courses provide a training suitable for those who are to take up responsible positions in industry, in many cases these schools provide the highest scientific and technical training required by particular industries.

APPENDIX 3.

EDUCATION FOR INDUSTRY IN OTHER COUNTRIES.

(a) THE CONTINENT OF EUROPE.

The Mechanical Revolution did not reach the Continent of Europe until late in the nineteenth century, whereas for nearly a century previous Britain had made the pace for the rest of the world in the field of Mechanical Invention. In this time the Continental nations had been able to "serve their apprenticeship" to the Mechanical Age and appreciate the need for organised Technical Instruction as a vital factor for Industrial survival.

FRANCE.

The French organised a National system of Secondary education at the beginning of the 19th century, and in 1833 regulations were issued for Higher Primary Schools, these schools did not shew much development, and it was not until 1882 that real efforts were made to establish a comprehensive system of Secondary Education.

When the need of Technical Instruction was experienced in the 80's, such provision was made "End-On" to existing Elementary and Secondary Schools, and from the beginning no confusion existed as to the type of vocational training to be provided for each class of student. Trade Schools were provided "End-On" to Elementary Schools for the workers, and the Technical High School came later as the end-on provision for the Secondary Schools which were regarded as providing suitable training for those aiming at positions of responsibility.

"THE TAXE d'APPRENTISSAGE"

After the Great War it became necessary to consider means of increasing the individual efficiency of each member in the state owing to evidence of a declining population. To do this all employers were taxed about 0.2% of their total wage bill and the money was devoted to extension and maintenance of facilities for training young workers. The tax has had the effect of specially interesting industry in technical education. The tax is distributed as follows:-ø

(1) Vocational guidance and the training of workmen and skilled artisans.
(2) The training of middle grades of workers.
(3) The training of the higher grades of workers and industrial research.
(4) Domestic instruction.

Certain exemptions from this tax are obtained by employers depending on the degree to which they go towards giving employees a complete training in the works.

ø "See also "Trade Schools on the Continent" 1932.

NOMENCLATURE OF TECHNICAL SCHOOLS.

Full Time Apprenticeship Schools) (a) l'ecole pratique
or "Trade Schools".) (b) l'ecole de metiers.

These schools are end-on to Elementary Schools. They were formerly administered by the "Ministry of Commerce under different names as under;-

(a) "Ecoles primaires superieures professionnelles"
(b) "Ecoles d'apprentissages"

These schools provide a thin stream of general education and a considerable amount of workshop instruction suitable for the training of craftsmen, but in small towns where there is no definite demand for trade instruction these schools give a general education with an industrial bias. All of these schools are now administered by the Ministry of Public Instruction and the age of entry is between 12+ to 13+ years.

ECOLES NATIONALES PROFESSIONNELLES.

These are only eight of these schools and they are suitably placed to receive boarders who are to be trained to become foremen or workshop managers, instruction is given chiefly in Woodworking and Metalworking Industries and allied subjects. The age of entry is between 13 and 16 years, and there is a competitive examination for entrance.

ECOLES D'ARTS ET METIERS.

There are only six of these schools and they give training suitable for the professional ranks of industry, there is a competitive entrance examination for students between the ages of16 and 19, and students are largely taken from other vocational schools although some are taken from the Academic Secondary Schools the "Lycees".

NON-SELECTIVE TRADE SCHOOLS.

In Paris the Trade Schools are Non-Selective, and the entrance to these schools depends entirely on physical fitness and the vocational guidance given to the students which determines the particular type of school he is fitted for. A certificate is awarded to leavers from these Trade Schools, which is of use when seeking employment.

THE MISUSE OF VOCATIONAL SCHOOLS IN FRANCE.

An interesting French parallel to certain educational problems now evident in England was referred to in the Appendix of the "Hadow Report" (The Education of the Adolescent 1926). P - 299 - 301.ø Before the "Ecole Primaire Superieure" was changed into L'ecole Pratique" it was observed that the students were mostly attracted to the general educational side of the school and less to the specialised departments of the school which were concerned with vocational work.

Extract. ø

"In certain districts with a large industrual population the industrial section was considerable but in many cases the work was directed largely to the preparation of boys for the competitive entrance examination of the "Ecoles d'Arts et Metiers" rather than for immediate entry into industry. This was not the purpose for which the schools were established but it was easier to recognise thise misuse than to secure its correction".

(b) EDUCATION FOR INDUSTRY IN BELGIUM.

Technical education is under the control of the Ministry of Labour and its organisation is parallel with that of industry. Recruits to industry are produced by schools of different types to join the ranks of industry at various stages. Each type of school has a definite aim and does not attempt to infringe on the aims of some other type of school thereby causing confusion in the highly organised machinery of technical education.

Types of Schools in Belgium.

"ECOLES PROFESSIONNELLES".

These are Trade Schools and at least half of the time is spent in the workshops, children are admitted at 14 years for a three years course. Some of these schools have a Junior Department separated from the Trade School proper into which students are admitted at 12+ years; a greater propertion of general education is included in the curriculum of these schools. These schools are also used for part time evening courses.

ECOLES MENAGERES.

These schools are for girls who are to enter industry at about 14 years, they are given practical instruction and include suitable domestic training.

ECOLES DU DESSIN INDUSTRIEL ET PROFESSIONNEL.

These schools are chiefly used to increase efficiency of workers, especially in workshop drawing and the reading of workshop plans. No attempt is made to give a complete training such as required by those aiming at higher posts. There are part time evening courses arranged for those unable to get during the day.

ECOLES INDUSTRIELLES.

These are part time schools held in the evenings and are designed to provide artisans with theoretical instruction to enable them to rise to positions of foremen and other positions of responsibility.

ECOLES SUPERIEURES.

These schools admit students are 16+ years from Secondary Schools, and 15+ years from Industrial Schools for a full time course lasting for three or fours years which is chiefly concerned with the scientific principles underlying certain industries, these schools closely resemble our Technical Colleges.

EQUIPMENT OF BELGIAN TRADE SCHOOLS.

The following extract from a report on "Trade Schools on the Continent" issued by the Board of Education 1932 indicates the quality of the equipment in Belgian Technical Schools, page 47. Chapter IV Belgium.

Extract.

> "The industrialisation of technical schools is, indeed much further advanced on the Continent than in this country. This applies to the schools in Belgium, and especially to the Trade Schools. Even the smallest are provided with some machine tools, and the largest are as fully equipped with machines and precision instruments as a modern industrial firm. At Charleroi, for example, the machine shop measures 130 x 45 metres, the forge 50 x 15 and the smithy 50 x 10. In the machine shop there are 430 vices and 77 lathes and all kinds of modern machine tools. The forge, the smithy, the tool room, the metal plate room, the welding room and the joiners shop are similarly well equipped. Precision instruments are common in all the schools."

(c) EDUCATION FOR INDUSTRY IN CZECHOSLOVAKIA.

This country resembles Belgium in its intensive organisation of Technical Education chiefly because of the conviction of the whole country that its survival depends on industrial efficiency. No workers in the skilled trades are permitted to practice their trades without serving an apprenticeship and producing a certificate which is a guarantee of their practical and technical training.

TRADE SCHOOLS.

The courses are generally of two years duration and about half of the time is spent in the workshops. The age of entry is about 14 years or over. These schools are primarily intended for recruits to industries where mechanism is replacing manual labour or where apprenticeship in its proper sense has become impracticable.

SCHOOLS FOR FOREMEN.

These schools are to provide capable men to take charge of production and the subjects taken are of a direct vocational nature, admittance is gained after experience in industry and only suitable recruits are taken in.

HIGHER TECHNICAL SCHOOLS.

These are of the nature of Technical Colleges and instruction is given chiefly in scientific principles underlying processes although provision is made for workshop instruction.

DAY CONTINUATION SCHOOLS.

These schools are intended for youths who are apprenticed and are not attending a trade school. They attend a vocational course of about one day a week at a Technical School.

ø "Trade Schools on the Continent 1932".

(d) EDUCATION FOR INDUSTRY IN HOLLAND.

The provision of Technical Education in Holland is very simply and apparently very effectively organised parallel with industry, and it is designed to supply recruits to industry at well defined stages. Although each grade of Technical School has a single aim, yet it is possible for deserving students to pass from the lowest grade of Trade School to the highest grade which is of University standard. The following are the various grades of Technical Provision:-

(1) University with five year courses in Technical subjects commencing at 18 years and leading to degrees.
(2) Middle Technical School with four year courses from about 15 years leading to Diplomas. These schools provide foremen and others who are to take responsibility for production.
(3) Primary Technical School (Trade School) with courses of two or three years commencing at 12+ years or 13+ years. This school is to provide skilled workmen and a Trade Certificate is issued on completion of the course.

The primary Technical School students are drawn from the Elementary Schools, and the Middle Technical School students are chiefly drawn from the Secondary Schools and a small percent of the Trade Schools. The University students are from the Secondary and Middle Technical Schools. Evening classes are arranged in courses of five years and they cover similar work to the Technical Day Courses.

(e) EDUCATION FOR INDUSTRY IN SWEDEN.

In Sweden Post Primary Education begins at 13+ years, this is much later than is usuall in other countries but this later age has certain advantages and le ads to more efficienctly organised vocational schools which are not encumbered with Preparatory courses of a general education. At 13+ years children have the following alternative courses of Post Primary education open to them should they fail to pass into the Secondary School.

Technical Schools and Agricultural Schools.

Elementary School children are selected at 13+ years for entrance into these Vocational Schools, they may afterwards pass into Higher schools of this type.

Municipal Intermediate Schools.

These schools have a four years course commencing at 13+ years and provide a general education leading to a public examination which is necessary for entrance into certain kinds of Government and Commercial work.

Higher Elementary Schools.

Children over 13+ years are grouped in these schools and the education is ~~high~~ either general or related to a group of industries, they contain from one to four classes.

"Higher Tops".

Extra classes are sometimes added to ordinary Elementary Schools for children over 13+ years, these really serve the purpose of Higher Elementary Schools (similar classes are found in the county of Durham).

Continuation Schools.

Attendance at these schools is compulsory for all children over 13+ years who are not attending one of the other forms of voluntary further education. These courses are of a part-time nature and are chiefly concerned with general education although some have a technical bias.

ø See also "The Education of the Adolescent" 1926.

(f) EDUCATION FOR INDBUSTRY IN THE UNITED STATES OF AMERICA.

The following are the broad divisions of American Technical Education:-

(1) Universities.
(2) Technical Colleges.
(3) Technical High Schools.
(4) Apprentice Schools.
(5) Trade Schools.
(6) Part-Time and Evening Classes.

The Universities and Technical Colleges have a somewhat similar position in the educational system to our own, they take a number of their recruits from various types of schools beside the Technical Schools, which are organised end-on to them.

The Technical High Schools prepare students for provisions in industrial life requiring skill and technical knowledge and of greater responsibility of those of skilled mechanics. In these schools instruction deals not only with important manual operations, but also with those principles of Science and Mathematics and their direct application to

industrial work that will help to prepare the student for mastering the fundamental processes and problems of those selected industries which the school is designed to reach. The aims of these schools have been stated by the "National Society for the Promotion of Industrial Education" as follows:-

(1) To educate the whole boy.
(2) To lay an appropriate foundation for Higher Education.
(3) To enable a boy to discover his innate mental and physical aptitudes.
(4) To furnish a broad basis for an industrial career should one's aptitude lie in the direction of the mechanical arts.

Pre-Apprenticeship Schools.

In these schools the training give is of a preparatory nature, boys need further training and experience in a workshop before making a journeyman. Most of the newer schools are of this type, of which the New York Vocational School for boys is an example. Founded in 1909, the school provides a two years course for about 800 boys, instruction is given in the following trades:-

Carpentry, Joinery (Hand and Machine work).
Cabinet Making.
Pattern Making, Wood Turning and Foundry Demonstrations.
Engineers Machinest, Lathes, Drilling, Milling, etc.
Plumbing.
Electrical Wiring and Installation.
Printing, Composing and Book-binding.
Mechanical Draughtsmen.
Architectural Draughtsmen.
Commercial Designer.

The aim of the school is to supply employers with boys who feel at home once they enter a workshop and settle down to it.

Trade Schools.

These schools afford specialised practical training in manual trades, with the object of preparing for immediate practical work in the trades as a wage earner. Such schools aim at taking the place of apprenticeship or part of it.

Part-Time Day and Evening Classes.

These courses are organised on similar lines to those available in Britain, they are very popular particularly with workers who wish to change their occupations; there are fewer barriers to American workmen changing their occupations than there are in this country.

NOTE. See also
(1) "School and Employment in the U.S.A" 1914. Board of Education.
(2) "The Roots of Vocational Education" 1931 W.P.Sears.
(3) Appendix Notes of "The Education of the Adolescent" 1926 Board of Education.

APPENDIX 4.

RECOMMENDATIONS ON THE PROVISION OF TECHNICAL EDUCATION FROM SPECIAL REPORTS.

These recommendations have been extracted from recent reports to indicate the present lines of advance in the national provision of Technical Education.

"Education for the Engineering Industry" 1931 Board Education.

Chapter IV. Conclusions "Recruitment and Training".

(a) 1. The Industry can beneficially absorb a larger number of recruits who have continued their full time education beyond the statutory school leaving age.

2. Assuming that satisfactory education is given in the extra year, the raising of the statutory school leaving age to 15, would, on the whole, be beneficial to the industry as involving a better educative recruit.

5. Where Central Schools exist, more deliberate efforts might be usefully made by Engineering firms to recruit boys from these schools.

6. Junior Technical Schools provide a most valuable type of recruit; the possibility of increasing the number of these schools should be favourably considered by the Board of Education and Local Education Authorities; and their continued existence in any scheme of educational re-organisation should be secured.

10. Steps should be taken to modify apprenticeship rules or customs where necessary so as to allow boys who have attended Central, Junior Technical Schools or Secondary Schools to enter apprenticeship at least up to the age of 17.

11. There is no demand that boys leaving Secondary Schools at about the age of 16, or over, shall have received specialised vocational instruction.

16. Recruitment to industry is often unsystematic, and it is most desirable that the industry as a whole should formulate the principles of a recruiting policy which would be applied in detail according to circumstances. The object of this policy should be to secure the larger supply of boys and young men who have continued their full time education beyond the statutory leaving age as Junior Technical, Secondary and other schools, or at Universities.

(b) 1. Training in the Works.

Systematic organisation of works training is comparatively rare. Every firm should adopt a definite policy in this matter.

3. Steps should be taken to broaden the training of trade apprentices who shew special promise by transferring them to the grade of engineering apprentice or by other means.

Conclusions on Part-Time Education.

(a) Organisation of Part-Time Education.

(1) It is very desirable that the practice of allowing time off for part time attendance at Technical Courses in the day time should be further extended.

(2) Arrangements for such attendance can usually be made for selective boys only, but suitably qualified trade apprentices and shop boys should be eligible for the privilege as well as engineering apprentices.

(3) Day attendance should normally be supplemented by attendance at evening classes on more than two evenings a week.

(b) Subjects of Instruction in Technical Schools and Colleges.

(4) Educational Authorities and teachers should consider the possibility of introducing instruction in the properties of materials in all types of course, not necessarily National Certificate Courses.

(6) There is considerable evidence in favour of the development of trade courses. The difficulties are considerable but such development will be exceedingly beneficial to the industry and the subject deserves most careful attention from schools and from employers.

(7) The instruction of foundry workers presents particular difficulties and the action of the Institute of British Foundrymen in connection with this problem should be very valuable.

Extracts from the Appendix of the Report.

"Engineering Sides" in Secondary Schools. Page 44. Appendix V.

Extract.

"No great amount of specialised instruction should be included in the programme of "Engineering Sides", and the work done by the pupil should not differ widely from that of his fellow pupils who are studying science. It is essential in planning the programme to remember that the boy who wishes to be a well qualified engineer will have to continue his studies at day or evening classes after entering the industry. The point to secure, as far as possible, is that he should not waste time when entering the technical school owing to his backwardness in any of the fundemental subjects, that is, Mathematics, Applied Science and Drawing. The education received in the Secondary School, that is to say, should be regarded as a definite preparation for the Technical School Course.

(11) Comments on the Report by Educational Bodies.

Incorporated Association of Assistant Masters in Secondary Schools. Page 59. Appendix.

Extract.

"The supply of boys from Secondary Schools to Engineering is not restricted because boys are not desirous of entering upon productive work, or are advised by schools to enter black-coated occupations, but because security of tenure and prospects of promotion appear better in the professions and in the commercial side of industry than in productive work. Hence boys, often owing to parents'

advice, avoid the works unless there are special circumstances. The actual prospects in engineering works might be laid before the pupils of Secondary Schools by accredited lectures, as is done in the Sheffield area under the auspices of the Juvenile Advisory Committee of the Ministry of Labour.

TRADE SCHOOLS ON THE CONTINENT. 1932. BOARD OF EDUCATION.

Summary of Conclusions - Page 109.

Extract. (3)

"It would be a mistake to replace the Junior Technical School, as it exists in England, by any form of pre-employment training seen on the Continent. This type of school should be maintained in its present form as a valuable part of our educational system, which serves to render smooth the transfer from full time schooling to full time employment of a number of the recruits to such constructive trades as Engineering and Building. The number of Junior Technical Schools in the country is not great, and it is desirable that more of them should be established, not only for constructive trades but for others whose conditions are or become suitable".

(4) "Trade Schools which prepare for a single occupation rather than for a group of related occupations, scarcely exist in England outside London, where they undoubtedly fulfil a very useful function. There is room and need for a considerable devebpment of this type of school, particularly in the provinces. Proper provision should, of course, be made for the continuance of the pupils' general education. The London Trade Schools are in fact excellent models.

HIGHER EDUCATION BULLETIN - NATIONAL UNION OF TEACHERS.

Report on Higher Education Work of the Union for 1932.

Technical Schools' Sub-Committee. - Page 5.

(a) "In the opinion of the Advisory Committee on Higher Education, Junior Technical Schools in which definitely vocational work is undertaken, i.e., Trades Schools, need a relatively high entrance age and should not receive pupils before 13+"

(b) "There Junior Technical Schools are part of Technical Colleges, the age of entrance should not be lower than 13+."

(c) "There is an urgent need for the development of an alternative type of school with a bias towards realistic and technical studies and an entrance age of 11+. All schools of this type should be administered under the regulations for further education. The considerable number of Junior Technical Schools which have been established in areas where their courses necessarily lead towards general industry rather than towards a specific trade must be included in this category

(d) "Facilities for transfer at 13+ from one type of school to another should be systemised and extended."

EAST MIDLAND EDUCATION UNION. 21st Annual Report.

Handbook 1933. "Industrial Problems and Education". (Mr.Graham)

Extracts Page 46.

"It has been suggested that boys entering industry should be graded into three categories, and the training arranged in c-operation with the educational authorities in order that boys of superior intellect may be assisted to develop their talent to the fullest extent; while boys of lesser intellect may be trained to occupy positions suited to their individual capacities.

Grade A. This group would consist of the boys of superior intellect and education whose training would be directed towards their eventually holding supervisory positions or of filling positions in the drawing office, technical or commercial departments.

Grade B. This group would consist of boys whose capacities do not warrant their inclusion in Grade A but who with suitable training would make efficient skilled craftsmen, inspectors, testors, charge hands and foremen.

Grade C. This group would consist of those boys who it is considered are not of a sufficient high standard to include in A. or B. but who with a certain amount of training would make efficient operators in production departments.

Educational Problems of the South Wales Coalfield. 1931 Board of Education.

Other Recommendations. (1) Technical Education. Page 74.

(4) That a scheme of Technical Education for industries outside the area should be developed.

(6) That in appointing teachers to Technical Classes, regard should be had not alone to their interest in the subjects of instruction and their experience of them, but also, in addition, to their understanding of the human need and special characteristics of the students.

(7) That local education authorities should consider the advisability of selecting from their establishments of full time teachers as a certain proportion who would act as part time day and part time evening teachers.

(15) That the advertising of evening classes should be made more attractive.

(16) That a close link should be established between the Junior and Senior Centres and between the Senior and Advanced Centres.

(17) That the Centres should be brought into closer administrative relationship to one another.

(35) That advisory education committees including representatives of employers and employees should be set up in relation to individual industries.

The Education of the Adolescent. 1926 Board of Education.

"The Facts of the Present Situation". Page 65.
Junior Technical Schools.

Extract.

(80) The Junior Technical Schools recognised up to the present appear to fall into two classes:-

80. (1) "Those dealing with industries in which manual craftsmenship is still of great importance; in these schools, which are popularly known in the London area as trade schools, the practical work is intended to develop a substantial measure of personal craftsmenship. Such schools provide in some degree a substitute for a year or two of apprenticeship or ordinary learnership".

(2) "Those concerned with industries connected with Engineering in which machinery is largely used, and in which the scientific principles underlying the construction and use of machinery are of paramount importance. Manual skill up to a certain point is taught in schools of this type, but its full development demands a range of machines with which the pupil can only become familar in the works.2

80. Page 66. "We consider that schools of the first type, within their own province, are doing most valuable work and should be developed so far as is possible in accordance with the needs and requirements of certain local industries.

We think that the same is true of Junior Technical Schools of the second type."

81. Page 67.

"Junior Technical Schools of the type which prepare boys for industries connected with engineering and the like, appear on a first view to be less restricted in their aim than the "Trade Schools", but it must be remembered that all pupils in these schools devote a large proportion of their time to studies such as Mathematics Science and Mechanical Drawing, and the time allotted to these subjects being very appreciably longer than the time that would normally be assigned to them in a Central School with an industrial bias. Furthermore in a Central School with an industrial bias there will generally be the possibility of an alternative course for such pupils as did not desire to take the course with the bias.

We think that it is highly inadvisable that a boy or girl should be placed at so early an age as that of 11+ in a school planned to give a course of definitely vocational education. The arrangement by which pupils are admitted to Junior Technical Schools at the age of 13+ greatly diminishes the risk of committing a child to a course which may ultimately prove unsuitable, and we accordingly recommend that for the present the normal age of entry to these schools should remain fixed at 13+."

Chapter 5. The Place of a "Bias" In the Curriculum of Modern Schools and Senior Classes. Page 119.

(123). "Many witnesses call attention to the necessity of a careful study of the general economic conditions of any given district, and of the occupations into which most of the pupils of local schools pass on leaving school, before any steps were taken to give a definite bias to the curriculum in the last years of the course.

(126). Conclusion. Modern schools and senior classes should, as a rule, give a practical bias to the curriculum in the third or fourth year of the course. This bias should be introduced only after careful consideration of local economic conditions and upon the advice of persons concerned with the local industries. It should be not of so marked a character as to prejudice the general education of the pupils. Adequate provision should be made for the needs of such pupils as may gain greater advantage by following more general course of study.

Report of H.M.Inspector on Education in Relation to Foundry Work.
1924 Board of Education.

(10) Pre-apprenticeship Training.

Extract. Page 11.

"Experience has shewn conclusively that in the present conditions of work in the Foundry Trade and owing to the low grade of boy that is attracted to the industry it is quite impossible to secure the voluntary attendance of foundry boys at classes in Mathematics, Physics and Chemistry as ordinarily given at evening schools."

Page 10.

"Here we are faced with the problem of how best to secure attendance at the school" (referring to continuation schools between the age of 14 and 16 years.)

"The remedy is to be found in two directions. The first and undoubtedly the best plan is to allow time off for attendance at school either on two mornings or two afternoons, or on one whole day per week. Boys should be paid for the time spent at school at the same rate as time spent in the works and the privilege of attending school should be withdrawn from those who shew their inability to profit by it. This plan may not be suited to the circumstances of all localities or works but it has been adopted successfully in some centres and certainly can be applied with advantage in many cases. The second plan is to allow time off with pay in the afternoon sufficient to allow for cleaning and recuperation to boys attending evening classes on the day in question."

A P P E N D I X 5.

STATISTICAL TABLES.

TABLE 1.

"APPRENTICE PERMEABILITY".

Distribution of Apprentices According to Size of Firm.

Industry	Nos. Workpeople Employed Per Boy Apprentice in Firms Employing Under-mentioned Workmen.							
	Under 5	5 to 10	10 to 20	20 to 50	50 to 100	100 to 200	200 to 500	Over 500
Engineering	2.3	3.4	4.8	6.6	6.9	8.4	9.4	13.6
Shipbuilding	--	2.9	3.1	3.0	5.8	7.2	7.4	8.0
Iron & Steel	--	--	--	2.9	8.8	12.8	50	50
Chemical	--	1.8	--	24.0	40.6	59	59	53.1
Building	2.4	3.8	5.0	6.8	10.0	12.4	15.5	22.9
Electrical Contracting	2.7	3.1	3.3	4.3	4.7	5.7	--	--
Furniture & Allied	1.9	4.2	5.8	5.9	9.0	11.8	14.1	44.9
Food, Drink, Tobacco.	3.2	6.0	7.2	13.0	17.6	33.4	37.7	99.4
Printing	2.7	4.3	5.4	7.1	9.4	10.7	15.6	35.6
Mercantile Marine	--	--	3.0	11.6	13.1	15.2	14.0	27.0

Note:- This table has been extracted from General Report VII on Apprentice Training. P.27.
The Workpeople referred to Include all Employed Persons of all Ages and Classes.

TABLE 2.

AGE AT WHICH BOYS COMMENCE.

Apprenticeship in Various Districts.

District.	Per Cent of Boy Apprentices Commencing Apprenticeship.				
	14 Years.	15 Years.	16 Years.	16 to 18 Years.	Nos. of Boy Apprentices.
Scotland	15.3	16.8	44.2	2.3	24,102
Northern Counties	11.2	7.7	67.5	1.2	12,915
Yorkshire	38.8	8.8	21.2	1.4	10,604
Lancashire & Yorkshire	49.0	4.9	15.9	0.3	22,213
North & West Midland Counties.	31.7	10.4	26.2	1.7	12,296
South Midland & Eastern Counties.	32.5	13.6	30.2	3.9	3,539
London	23.6	16.4	25.5	6.6	7,739
Southern Counties	23.5	12.7	36.0	1.3	6,479
Wales & Monmouthshire.	19.3	13.3	35.1	1.9	1,948
Northern Ireland	11.4	7.7	41.4	0.6	2,814
Gt.Britain & N. Ireland.	28.0	10.9	34.0	1.8	104,649

Extracted from Table VII Gen.Report V.II.P.176 "Apprenticeship

TABLE 3.

"PROPORTION OF MALE APPRENTICES UNDER WRITTEN OR VERBAL AGREEMENTS AND OF LEARNERS EMPLOYED IN EACH DISTRICT.

District	Number Male Trainees (Apprentices & Leavers Returned.	Percent.number of Male Trainees who are Apprentices Under Indentures or Other Written Agreements.	Verbal Agreements.	Learners.
Scotland.	25,799	16.1	77.3	6.6
Northern Counties.	13,439	44.2	51.9	3.9
Yorkshire.	14,754.	12.2	59.7	28.1
Lancashire & Cheshire.	27,763	23.0	57.0	20.0
North & West Midland Counties.	23,299	24.6	28.2	47.2
South Midland & Eastern Counties.	5,407	40.0	25.4	34.6
London.	13,489	44.9	12.5	42.6
Southern & South West Counties.	8,304	48.2	29.8	22.0
Wales	2,118	58.2	33.8	8.0
Gt.Britain.	134,372	27.9	47.9	24.2
North Ireland.	2,959	50.2	44.9	4.9
Great Britian & North Ireland.	137,331	28.4	47.8	23.8

Note:- (1) Table from General Report Vll on "Apprenticeship Training.
(2) Northern Counties. Northumberland, Cumberland, Durham, Cleveland District, Yorkshire.

TABLE 4.

THE GROWTH OF THE JUNIOR TECHNICAL SCHOOL.

(a) Growth in Number of Schools.
(b) Total Number of Pupils (Boys and Girls).

Year.	Nos.of Schools.	Total No. of Pupils.
1901	1	89
1906	3	
1911	14	897
1913-14	37	No Information
1914-15	49	Available.
1915-16	53	-do-
1916-17	54	-do-
1917-18	61	-do-
1918-19	69	-do-
1919-20	78	9,811
1920-21	84	11,235
1921-22	86	12,071
1922-23	86	12,207
1923-24	87	11,988
1924-25	89	11,954
1925-26	92	12,704
1926-27	101	18,704
1927-28	104	19,541
1928-29		20,753
1929-30	115	19,537
1930-31		24,066

From Board of Education Reports.

TABLE 5. STATISTICS.

Juvenile Unemployment at Sunderland.
Boys and Girls on Live Unemployed Register During 1933.

	Boys.	Girls.
January	933	494
February	786	501
March	746	424
April	775	388
May	673	312
June	639	268
July	657	360
August	758	372
September	770	328
October	715	358
November	644	273
December	585	182

Figures Supplied by "Secretary of Juvenilex Advisory Committee".

TABLE 6. SUNDERLAND JUVENILE ADVISORY COMMITTEE.

Juvenile Placing 1933.

921 Boys Placed Locally.
21 " " Outside Borough.
1338 Girls " Locally.
57 " " Outside Borough.

2,345 Total Placings.

Figures supplied by Mr.H.R.Awmit. "Secretary of the Sunderland Juvenile Advisory Committee.

TABLE 7.

EARLY TRAINING SCHOOLS ATTENDANCE BY MALES UNDER 30 YEARS.

Age Group.	No.of Claimants.	Elementary %	Secondary %	Total %
16-17	124	91.1	8.9	100.0%
18-19	443	95.0	5.0	"
20-24	1,282	93.4	6.6	"
25-29	1,197	95.3	4.7	"
All Under 30.	3,046	94.3%	5.7%	100.0%

From "Report on Investigation into Personal Circumstances and Industrial History of 9748 Claimants to Unemployed Benefit". (1928)

TABLE 8.

AGE ON LEAVING SCHOOLS OF THOSE CLAIMING UNEMPLOYED BENEFIT OF ALL AGES UP TO 30 YEARS.

Year.	Under 14 Years.	14	15	16	17	18
1923	26.2	67.8	3.5	2.0	0.4	0.1
1924	23.8	70.1	3.8	1.7	0.5	0.1
1927	24.4	70.1	3.4	1.8	0.2	0.1

From "Report into Investigation of Personal Circumstances and Industrial History of 9748 Claimants to Unemployed Benefit". 1928.

TABLE 9.

DIFFERENCE CHART.

Difference in Per Cent of Indentures or Other Written Agreements and Verbal Agreements in Each District.

DISTRICT.	+ Excess % of Verbal Agreements. - Excess % of Indentures or Written Agreements.	% of Trainees who are Apprentices.
SCOTLAND	+ 61.2	93.4
NORTHERN COUNTIES	+ 7.7	96.1
YORKSHIRE	+ 47.5	71.9
LANCASHIRE AND CHESHIRE	+ 34.0	80.0
NORTH & WEST MIDLAND COUNTIES	+ 3.6	52.8
SOUTH MIDLAND & EASTERN COUNTIES	- 14.6	65.4
LONDON	- 32.4	57.4
SOUTHERN & SOUTH WESTERN COUNTIES	- 18.4	78.0
WALES	- 24.4	92.
GREAT BRITAIN	+ 20.0	75.8
NORTHERN IRELAND	- 5.3	95.1
GREAT BRITAIN & NORTHERN IRELAND.	+ 19.4	76.2

TABLE 10.

ENGLAND AND WALES.

Percentage of Boys Leaving School 31st March 1930.

Boys Leaving Elementary Schools for:-	Under 11	11 & Under 12	12 & under 13	13 & under 14	14 & under 14.3 mths.	14-3 under 15.	15 & under 16	16 & over.	TOTAL
Secondary Schools	1.9	6.1	2.5	0.7	0.1	0.1	0.0	0.0	11.5
ø Junior Technical Schools	0.0	0.1	0.5	1.1	0.3	0.2	0.0	0.0	2.3
Other Full-Time Institutions.	1.3	0.5	0.4	0.5	0.2	0.1	0.0	0.0	3.0
Employment	--	--	--	8.6	55.2	10.8	2.8	0.5	77.9
Other Reasons	3.0	0.7	0.6	0.7	0.2	0.1	0.0	0.0	5.3
All Reasons.	6.3	7.4	4.1	11.6	55.9	11.2	2.9	0.6	100.

Dynamic Survey:- How Pupiles move from Elementary School into Other Types of Post Primary Education.
(From Board of Education Report 1930.)

ø This Includes Junior Housewifery Schools, Junior Art and Nautical Schools.

TABLE 11.

AGE AT WHICH BOYS COMMENCE APPRENTICESHIP.

District.	Percent of Boys Apprentices Commencing Apprenticeship									
	14 Yrs.	14/15	14/16	14/14	15 Yrs.	15/16	15/18	16 Yrs.	16/18	18 Yrs. Over.
Scotland	15.3	3.0	7.2	3.4	16.8	6.2	0.5	44.2	2.3	1.1
Northern Counties	11.2	1.7	7.1	0.2	7.7	1.9	0.5	67.5	1.2	1.0
Yorkshire	38.8	5.6	20.4	0.1	8.8	2.7	0.3	21.2	1.4	0.7
Lancashire & Cheshire	49.0	7.6	15.0	0.1	4.9	6.3	0.5	15.9	0.3	0.4
North & West Midland Counties.	31.7	10.6	11.3	1.5	10.4	3.6	1.2	26.2	1.7	1.8
Midland & E.Counties	32.5	7.0	7.1	0.1	13.6	4.0	0.4	30.2	3.9	1.2
London	23.6	7.6	11.4	0.7	16.4	4.0	3.3	25.5	6.6	0.9
Southern Counties	23.5	8.1	7.6	0.5	12.7	9.7	0.4	36.0	1.3	0.2
Wales & Monmouthshire	19.3	3.5	4.5	1.4	13.3	6.9	14.1	35.1	1.9	--
Northern Ireland	11.4	0.7	13.9	--	7.7	17.0	0.9	41.4	0.6	6.4
Gt.Britain & N.Ireland.	28.0	5.6	11.3	1.1	10.9	5.3	1.0	34.0	1.8	1.0

From General Report "Apprentice Training" P.176,Table VII.

TABLE 12.

OCCUPATIONAL ANALYSIS OF JUNIOR TECHNICAL SCHOOLS.

School.	General Engineering.	Commercial Work.	Trades of Industrial Type.	R.N.& RAF. Artificers.	Mercantile Marine.
Heaton J.T.S. Newcastle. 1919-1931.	51.0%	24.6%	19.1%	2.9%	2.4%
Atkinson Road J.T.S. Scotswood. 1928-31	48.2%	24.4%	23.2%	2.4%	1.2%
Sunderland J.T.S. 1919-31.	60.88%	19.9%	6.65%	3.04%	6.65%

From Analaysis of Record Cards and Register.

TABLE 13.

BEDE SECONDARY SCHOOL, SUNDERLAND.

Year	1926-7	1927-8	1928-9	1929-30	Aver. Nos. Students.	% Leavers of Aver. Total.	Proportions of those Leaving.
No.Pupils Present.	362	346	364	391	365	--	--
Passed Oxford Sen.Cert.	33	34	38	31	34	51.6	3
Went into Teaching Prof.	12	10	10	6	10	15.2	1.
Commerce & Trade.	44	36	34	34	35	56.0	4
Professions.	19	20	17	19	19	28.8	2
No.Leaving.	75	66	61	60	66	100.0	7

ø Figures Supplied by Headmaster.

RUTHERFORD SECONDARY SCHOOL, NEWCASTLE.

Year.	1926-7	1927-8	1928-9	1929-30	1930-31 ø&ø	Aver.Nos. from 1928-9	Prop. of those Leaving
Nos.Pupils Present	800	790	500	420	420	Varying	--
Passed Durham Sen.Cert.	73	103	109	67	55	"	9
Went into Teaching Prof.	--	18	12	15	11	13	2
Commerce & Trade.	--	--	77	79	49	68	11
Professions	--	--	8	6	4	6	1
No.Leaving	--	--	97	100	64	Varying	14

ø Figures Supplied by Headmaster.

NORTHUMBERLAND COUNTY SECONDARY SCHOOLS.

Occupations.	1930	1931	Total	Percent ø	Prop. of Those Leaving.
General Engineering.	20	11	31	9.0	1
Trades of Industrial Type.	18	29	47	13.5	2
Commercial.	105	86	191	55.2	8
R.N.& R.A.F.Artificers.	10	12	22	6.4	1
Went into Teaching.	13	17	30	8.7	1.
Professions	Incl.in Commerce.	25	25	7.2	1
Total Leavers	166	180	346	100.0	14

ø The Total Excludes Deaths, Illness, Left District, Unknowns etc. These figures were obtained from the Report on the Northumberland Education Committee Feb.1932 (analysed Recording to Nomenclature Appendix 1.)

WALLSEND SECONDARY SCHOOL.

Year.	1926	1927	1928	1929	1930	1931	Aver. Nos.	% of Leavers.
Nos.Pupils.	137	142	132	132	144	159	143	--
Passed Durham Certif.	10	8	15	14	13	25	14	63.6
Teaching Profession.	2	3	3	14	2	--	2	9.1
Commerce & Trade.	12	9	13	16	9	12	12	54.7
Professions.	--	--	--	3	--	--	0.5	--
Engineering	7	6	11	12	5	5	8	36.3
Total Leavers	21	18	27	35	16	17	22	100.0

TABLE 14

OCCUPATIONAL ANALYSIS

HEATON JUNIOR TECHNICAL SCHOOL (FOUNDED) 1909. OCCUPATION ANALYSIS (FROM 1914 ONWARDS. 1536 STUDENTS.

YEAR OF LEAVING	1916	1917	1918	1918	1919	1919	1920	1920	1921	1921	1922	1922	1922	1923	1923	1923	1924	1925	1925	1926	1926	1926	1926	1927	1927	1928	1928	1928	1929	1929	1929	1930	1930	1930	1931	1931	1931	1932	1932	1933	1933	1934	1934	1935	1935
MONTH.	July	July	July	July.			July		July			July		July		Dec	Dec	July		Jy	April	Jy	Dec	April	Jy	Dec	April	Jy	Dec	Apr	Jy	Dec	Apr	Jy	Dec	Apr	Jy							
Pg IN LEAVING REG	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80	82	84	86	88	90	92	94	96
OCCUPATIONS GENERAL REGISTER	24	25	27	25	28	28	25	20	27	20	15	15	16	10	21	14	13	11	14	14	17	15	11	12	20	12	13	9	15	20	14	13	12	16	10	13	18	5	1	1							
TRADES OF INDUST.	2		1		2	1	1	6	1	2	2	5	1	4		5	6	4	3	6	8	11	9	12	5	2	9	2	7	3	8	5	3	7	6	3	7	2							
R.N. & R.A.F. ABINITIO	1		1											1			1			1		1		1	2	4	3	2	1			2	1		1	2									
MERCENTILE MARINE										1	1			1		1	1			1	1	1	1	1		1		2	1	1		1		2		1									
COMMERCIAL		2		2		2		2	1	7	12	9	9	13	4	9	7	13	7	11	4	3	8	4	3	4	6	4	3	3	5	3	5	4	7	7	11	4	2							
CONTRACT		2	4	4	2	1	6	4	3	2	2	3	6	3	6	3	4	5	8		2	1	4	2	2	9	3	4	4	5	4	6	10	5	6	7	5	5	1	2							
STILL AT SCHOOL																																						16	28	29	32	32	32	32	32	32	32
YEAR OF ADMISSION	1914	1914	1915	1916	1916	1917	1917	1918	1918	1919	1919	1919	1920	1920	1920	1921	1921	1921	1922	1922	1922	1923	1923	1923	1924	1924	1924	1925	1925	1925	1926	1926	1926	1927	1927	1927	1928	1928	1928	1929	1929	1929	1930	1930	1931	1931	1931	1932
MONTH OF ADMISSION	Oct.	Oct.	Oct	Oct	Nov.	Sept	Sept	Aug	Aug	Sept	Sept	Sept	April	April	Sept	Jan	Sept	Jan	Jan.	April	Sept	Jan	April	Sept	Jan.	April	Sept	Jan	April	Sept	Jan	April	Sept	Jan	April	Sept	Jan	April	Sept	Jan	April	Sept	May	Sept.	Jan	April	Sept	Jan

APRIL OCT. APRIL OCT. FALL SEPT. APRIL SEPT. JAN. APRIL SEPT. JAN. - APRIL SEPT 1921

TAKEN FROM ENROLMENT REGISTERS

A P P E N D I X 6.

CLASSIFIED BIBLIOGRAPHY.

APPENDIX 6.

CLASSIFIED BIBLIOGRAPHY.

A SCIENTIFIC STUDY OF MODERN INDUSTRIAL TENDENCIES IN THE N.E.C.AREA.

Title.	Author	Publisher	Date
Industrial Survey of North East Coast Area.	Armstrong Coll. for the B.O.T.	H.M.S.	1932
Ministry of Labour Gazette (Monthly)	Ministry of Labour,	-do-	1933
Ministry of Labour Annual Report 1931.	-dd-	-do-	1932
Industrial Transference Board Report	-do-	-do-	1928
Guide to Current Official Statistics	H.M.S.	-do-	1933
Ministry of Labour Annual Report 1932	Ministry of Labour	-do-	1933
International Labour Conference Geneva	Committee	-do-	1933
Statistical Abstract for U.K.	B.O.T.	-do-	1933
Northumberland & Durham Coalfield No.27 Survey.Hutton Seam Fuel Research	Dept.of Scientific & Indust.Research	-do-	1933
Official Industrial Handbook for Sunderland	Sunderland Corporation	R.L.Rutter, Sunderland	1933
River Tyne - Official Handbook of Commissioners	R.W.Johnson & R.AUGHTON	Andrew Reid Newcastle	1930
History of Sunderland	W.C.Mitchell	Hills Press Sunderland	1919
A Social Survey of the Tyneside "Industrial Tyneside"	H.A.Mess	E.Benn	1928
Victoria County History of Durham. Vol.2			
The Basic Industries of Gt.Britain by Lord Aberconway			
THE COAL INDUSTRY OF THE 18TH CENTURY	T.S. ASHTON & J. SYKES	MANCHESTER UNIV. PRESS.	1929
MODERN INDUSTRIAL TENDENCIES	SIR. CHARLES W MACARA BART	SHERRAT & HUGHES MANCHESTER.	1926

CLASSIFIED BIBLIOGRAPHY.

MODERN TENDENCIES IN RECRUITMENT TO INDUSTRY IN THE AREA.

Title	Author	Publisher	Date
Apprenticeship and Training 1925-26 General Report V11, - Printing and Allied Industries 1. - Building and Woodworking and Allied Industries 11- Mining, Quarrying, Metal Extraction 111. - Chemical, Glass, Pottery and Allied Industries 1V. - Govt.Depts. Public Utility Services, Distributive Industries V. - Engineering, Ship-building and other Metal Industries V1.	Ministry of Labour	H.M.S.	1928
Report of H.M.Inspector on Education in Relation to Foundry Work.	Board of Education.	H.M.S.	1924
National Advisory Council for Juvenile Employment. Junior Instruction Centres and Classes 1st Report. Age of Entry into Unemployment Insurance 2nd Report. Courses of Instruction for Boys and Girls 3rd Report.	Ministry of Labour.	-do-	1929 May 1929 Nov. 1930.
Hours of Employment in Unregulated Occupations. 4th Report.	-do-	-do-	
Report into Personal Circumstances and Industrial History of Claimants to Unemployment Benefit 1927.	-do-	-do-	1928
Report of Northumberland Education Committee.	Northumberland Educ. Comm.	Private	1932
Proposals for a new J.T.S.at Sunderland.	Educ.Commit.	Private	1930.
The Junior Technical School.	B.Education.	H.M.S.	1930
The Central School	Newport Educ. Committee.	Private	1925
Curricula of Secondary Schools in England.	Board of Education.	H.M.S.	1922.
The Next Step in National Education	Haldane Committee.	London U. Press.	1927
Education for Industry and Commerce	Lord E.Percy B.Education	H.M.S.	1928
The Admiralty Method of Training Dockyard Apprentices.	Board of Education	H.M.S.	1916
The Training of the Engineer	Transactions of N.E.C.Inst.		1929-30.
Report on Engineering Trades after the War.	Board of Trade	H.M.S.	1918
Explanatory Memorandum on Clauses	Min.Labour	-do-	1935
Trade Schools on the Continent	B.Education	-do-	1932
Day Classes for Engineer.Apprentices	-do-	-do-	1928
Education in 1931 (Annual Report)	-do-	-do-	1932
Report on Financial Provisions of Part 1 of Bill relating to Unemployment Insurance.	Ministry of Labour	-do-	1933
The Work of Juvenile Organisation Committees.			1933
Report on Work of Local Committees for Juvenile Employment during 193	Min.of E.Labour	H.M.S.	1933
Education for the Engineer.Industry	B.Education	-do-	1931
The Teaching of Engineering in Evening Technical Schools.	-do-	-do-	1923
Memorandum on the Shortage Surplus and Redistribution of Juvenile Labour during 1928-33.	Ministry of Labour	-do-	1929
NEWCASTLE-ON-TYNE ITS MUNICIPAL ORIGIN & GROWTH CHAP. ON "GUILDS"	C. D. RENDEL	ARNOLD	1898

CLASSIFIED BIBLIOGRAPHY.

THE PROVISION AND REGIONAL ORGANISATION OF TECHNICAL EDUCATION ON THE NORTH EAST COAST.

Title	Author	Publisher	Date
Educational Administration	Sir Graham Balfour	Clarendon Press	1921
An Outline of the Structure of the Educational System in England & Wales	Board of Education	H.M.S.	1933
Report on Local Co-operation between Universities, Local Education Authorities and Voluntary Bodies.	Paper 1.Adult Education Committee	-do-	1922
Prospectuses for all Technical Colleges and Evening Institutes in the Area, including those under Durham County & Northumberland Authorities and those for Sunderland, Rutherford,Constantine, Darlington,West Hartlepool,Stockton, Gateshead, Tynemouth, Jarrow and Wallsend Technical Institutes and Colleges.			1933-4
Armstrong College Calendar	Senate		1933-4
Arrangements for the Award of National Certificates in Mechanical Engineering	Board of Education	H.M.S.	1930
Day Classes for Engineering Apprentices	-do-	-do-	1928
Choice of Careers Series	Min.Labour	-do-	1933
Day Classes for Building Apprentices	Board Educat.	-do-	1928
Education at the Cross Roads	Lord E.Percy	-do-	1930
Mechanical Aptitude	J.W.Cox	F.T.Allan	1928
The Roots of Vocational Education	W.P.Sears	Chapman & Hall	1932

MEMORANDA.

The Education of the Adolescent	Hadow Committee	H.M.S.	1926
Recent Educational Developments in Sweden.	Board of Education	-do-	1930
Trade Schools on the Continent	-do-	-do-	1932
Education for the Engineering Industry	-do-	-do-	1932
Report on Higher Education	National Union Teachers	Private	1933
Educational Problems of the South Wales Coalfield	Board of Education.	H.M.S.	1931
Report of Investigation into Personal Circumstances and Industrial History of 9748 Claimants to Unemployed Benefit.(1 out of 100 claimants on Live Register)	Ministry of Labour.	-do-	1928
Report into Personal Circs.and Industrial Hist.of 3331 Boys and 2701 Girls registered for Employment Exchanges and Juvenile Employment Bureau.(10% of Boys and Girls registered for Employment).	-do-	-do-	1925
TECHNICAL EDUCATION, ITS DEVELOPMENT AND AIMS	C.T. MILLIS	Ed. ARNOLD & Co	1925
EDUCATION FOR TRADES AND INDUSTRIES	C.T. MILLIS	" do. "	1932