

MINING EDUCATION IN ENGLAND AND WALES IN THE SECOND HALF OF THE NINETEENTH CENTURY

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Mining, in particular coal mining, figured prominently in Britain's export trade during the second half of the nineteenth century. This was so despite inadequate facilities for mining education at both manager and worker level. Despite the adverse criticisms of Royal Commissions which pointed out the urgency of the problem governments did little other than set up a School of Mines around mid century and even this, for a variety of reasons, did not meet with the success expected of it. Mining areas such as Wigan and Cornwall attempted to take matters into their own hands and established mining institutions, but these suffered from the lack of financial support and from other factors. Training was based on apprenticeship schemes and whereas mining education on the Continent became a part of the higher education system at an early date, in Britain mining did not become a recognisable academic discipline until the 1880s. The result was that only a handful of the industry's leaders received a rigorous scientific training prior to 1900.

It is essential for the progress of the industry of this country that those to whom is entrusted the management of large concerns should have generally a higher class of education than that which they possess at the present time (7, p 622)

Thus spoke Isaac Lothian Bell, a leading manufacturer of iron and coal in presenting his evidence to the members of the Royal Commission on Scientific Instruction and the Advancement of Science in 1870 (the Devonshire Commission). The period 1860 to 1880 was one of re-evaluation of the whole field of scientific and technical education. No fewer than four Royal Commissions were appointed, and two of them—the Devonshire Commission and the Royal Commission on Technical Education headed by Bernhard Samuelson—included mining education in their deliberations.

At the time when the Devonshire Commission reported (1872) there were few facilities for higher education in mining in England and unfavourable comparisons were drawn with the situation on the Con-

inent In London there was the Royal School of Mines at Jermyn Street, in Newcastle there was the recently opened College of Physical Science which gave particular emphasis to mining, and at Wigan there was a Mining School which had started shakily but later prospered and which exists today as the Wigan Technical and Mining College A mining school had been in existence at Bristol for a short time but this had almost collapsed and was saved only when it became merged with the Bristol Trade School

The position was very different on the Continent According to Warrington Smyth, Professor of Mineralogy at the Royal School of Mines, there were two mining academies nine mining schools, and nine preparatory schools in Prussia alone (7) The system of training in England did not depend to a great deal on higher academies but rather on apprenticeship In colliery engineering, said Smyth, an engineer took in a number of pupils to his office where they received scant attention but paid handsomely for the privilege When asked by the Devonshire Commissioners whether there was any continental mining district of equal extent to that of North and South Staffordshire without a mining school, his answer was most emphatic, 'No, certainly not' (7, p 147) British mine managers, he stated, were inferior in general acquirements to the Germans but had greater energy and practical acquaintance

The outstanding institution on the Continent was the Freiberg Mining Academy founded in 1766 The institution was state-endowed and its professors received their salaries from the government The Academy provided courses of lectures in all branches of science allied to mining and metallurgical processes It had the advantage over the Royal School of Mines of London of being sited in the centre of a mining district Throughout Germany mining education was systematically organised and was of a uniformly high standard There was in each district a major mining school served by preparatory schools Warrington Smyth was enthusiastic about the German system, but he saw little hope of such a system being established in England without the direct intervention of the central government

During the nineteenth century it was the common practice to obtain trained managers and experts from the continent—this was so in chemistry, smelting, engineering and mining When asked to account for this by the Devonshire Commissioners, Smyth pointed out that it was because owners could not get the same English trained experts Mr

Vivian at Swansea for instance over the previous quarter of a century had been obliged to get assistants who had passed the courses at Freiberg (7)

THE ROYAL SCHOOL OF MINES

The School of Mines originated in 1837 as the Museum of Economic Geology following a suggestion made by Henry De la Beche (later Sir Henry De la Beche, Director General of the Geological Survey) to the Chancellor of the Exchequer. A year later an influential committee of the British Association for the Advancement of Science recommended a National Depository for the preservation of documents and records relating to the mining operations of the country and the Museum became the place of deposit for the Mining Records in 1839.

The Museum was opened to the public in 1841, pupils being instructed in chemistry, metallurgy and mineralogy. In the same year the Museum of Economic Geology and the Geological Survey were united under one government department. Sir Henry De la Beche was appointed Director-General of the Museum and his staff included Edward Forbes (palaentologist), Warrington Smyth (mining geologist), and Lyon Playfair in chemistry.

In 1849 a Committee of the House of Lords commented that

A want appears to be felt of facilities acquiring education, such as are provided by the mining schools and colleges established in the principal mining districts of the continent, apparently with the most beneficial results (3)

The small attendance during the first and ensuing sessions was a disappointment to everyone, for it was expected that the mining districts at least would have sent students. Forbes suggested that the classes of people for whom it was intended could not afford the high fees or were not available for day instruction.

It was only to be expected that the School of Mines would be a topic of concern to both the Devonshire and Samuelson Commissions. The Museum of Economic Geology had been built according to the ideas of Sir Henry De la Beche, and its purpose was to apply the science of chemistry to agriculture—the great topic of the day. Trentham Reekes, Registrar of the School of Mines, confessed to the Devonshire Commission that the School of Mines had been grafted on to the Museum and 'the whole thing was an experiment, the Museum was

built scarcely contemplating that the School of Mines would be established and proper preparation was not made (7, p 19) To meet the need for a school of mines the Museum of Economic Geology was moved from its cramped quarters in Craig Street to new buildings in Jermyn St, off Piccadilly, in 1851 It was renamed the School of Mines and of Science Applied to the Arts and a brilliant staff of teachers was appointed Warrington Smyth in Mining and Mineralogy, Robert Hunt in Applied Mechanics Dr Lyon Playfair in Practical Chemistry, Dr John Percy in Metallurgy, Edward Forbes in Natural History and Andrew Ramsay in Geology

Henry De la Beche as Director read an address to HRH Prince Albert who had been invited to perform the opening ceremony He said 'To your Royal Highness it would be needless to point out the bearings of mining schools of France, Saxony, Prussia and Austria upon the mineral resources of those countries—the useless expenditure they prevent and the real productiveness they promote (14)'

Mr William Hopkins speaking of the School in his Presidential Address to the Geological Society, said

The Museum of Practical Geology cannot fail to exercise an important influence The lectures will help to extend an abstract knowledge of geology and the allied sciences, and cannot fail to accord useful aids to some of the most important material interests of this country Perhaps no one of these great interests has suffered more from want of scientific knowledge than that of mining (9, p lxxix)

All seemed set fair for success but, in the event, the expected success did not materialise for some time Edward Forbes writing to Ramsay commented that, 'there are seven bona fide matriculated students entered for the two years, and twenty or so occasionals, chiefly soldiers Besides these we have a few ladies and philosophers whose tickets have been backed by one or other of us and very disappointingly the districts that memorialised for mining schools have not sent a single pupil (15, p 492)' A W Williamson, Professor of Chemistry at University College, London, considered that the School of Mines was more of a success as a school of science and did more good in that role than as a school of mines

A fundamental weakness over the policy regarding the School of Mines was, according to Lowthian Bell, its siting in London He was naturally very pleased at the establishment of the College of Physical Science at

Newcastle in 1871 and in evidence to the Devonshire Commissioners stated

We may reasonably hope, by having men of pure science settled in manufacturing districts and brought in contact with those great industrial questions of the day, that they would be more likely to have their attention directed towards departments, metallurgical or mining, than they could possibly have here in London, where they rarely have an opportunity of meeting, either the one or the other (7, p 623)

Lionel Brough, Inspector of Mines for the South West District, was another who considered London an unsuitable centre. He agreed with the Commissioners that Merthyr Tydfil would have been a better centre for a Mining School. Brough informed the Devonshire Commissioners that he had not met any former pupils of the School of Mines as colliery managers, although he had come across several metallurgists. Brough was Inspector of Mines of the South West District, an area which took in Monmouth, Somerset and Gloucestershire, but Isaac Lowthian Bell the iron manufacturer and colliery owner who operated in the Middlesborough and Newcastle area was of the same opinion. Warrington Smyth in his evidence agreed that not a great number of ex-pupils become mine managers. According to Brough, pupils of the Royal School of Mines had 'got scattered more abroad in the British colonies, they have sought for employment abroad more than they have at home (7 p 155)' and the reason behind this was that they sought better employment and remuneration.

How far were these strictures and comments on the Royal School of Mines justified? They can be checked by reference to a Register of the Associates and Old Students of the Royal School of Mines which was put together by Theodore Chambers, himself an Associate of the Royal School of Mines. (The Associateship was an award granted to students who completed a prescribed course of study, it was in effect equivalent to a degree.) It is true that the numbers of students were indeed small and the number who gained an Associateship of the School did not exceed 6 in any year until 1869, and did not reach double figures until 1876, but thereafter numbers increased fairly regularly and by the 1890s had reached 40. During the two decades 1855-75, the School produced 99 Associates but during the following two decades it exceeded 400. This indicates that support was forthcoming for the school, albeit rather slowly.

A defect of considerable significance was pointed out by Dr Lyon Playfair. He claimed that pupils came up to the School completely untrained in science, a fact which involved loss of time in their having to learn the elements of science instead of its applications (10). This was true of all higher institutions of learning at the time and was a reflection of the absence of suitable scientific instruction at the secondary school level.

One of the main objects of the school was 'to give a practical direction to the course of study, so as to enable the student to enter with advantage upon the actual process of mining, or of the Arts which he may be called upon to conduct (1, p 11)'. Unfortunately although students could study any combination of the three subjects (geology, metallurgy and mining), of the 500 or so Associates, less than half had studied mining, either on its own, or in combination with one of the other subjects. Chambers' survey reveals that of the past students of the school some 55 per cent entered mining abroad, mainly in South Africa, Australia, India and North America. Allied with this figure of 55 per cent, some 28 per cent became lecturers or teachers and this indicates the attractions of the safe profession of teaching as compared to the uncertainties and perhaps poor remuneration of the mining industry. Only about 10 per cent entered mining in various capacities as mine managers or mining engineers. These figures support Lionel Brough's contention that students 'have sought for employment abroad more than they have at home (7, p 155)'.

MINING AS A UNIVERSITY STUDY

During the nineteenth century, both geology and mineralogy were very fashionable pursuits among scientific amateurs and some of the new universities created chairs in these subjects on their foundation. Others, however, paid little attention to the subjects. Liverpool, for instance had no Chair of Geology until 1916, Sheffield until 1906 and, indeed, Professor N S Maskelyne, Professor of Geology and Mineralogy at Oxford, where there had been a Chair since 1813, confessed to the Devonshire Commissioners that his last course in crystallography had only five students and his mineralogy course had only three students, and 'there is no great demand for the subject and as yet Geology has been very imperfectly pursued at Oxford (7, p 265)'.

If geology and mineralogy were not actively pursued by the English

universities (in 1870 there were fewer than half a dozen honours graduates in geology), the position in metallurgy and mining, as one would expect, was worse. By 1900 there were only five departments of mining in English universities. These were at Newcastle, Sheffield, Leeds, Birmingham and Nottingham. The first chair in mining was at Newcastle. Many years before this came into being, Mr Nicholas Wood, Chairman of the Mining Association of Great Britain, had publicly urged the foundation of a mining college and although discussions went on for years nothing came of them. In 1855, the Duke of Northumberland offered £10,000 on condition that other people would provide a further £30,000. This sum was not forthcoming and his scheme fell through. Following this, a memorial was presented to the government but nothing came of that either.

As there was no proper provision of science teaching at Durham University (the college at Newcastle-upon Tyne was part of the University of Durham until granted separate university status in 1963), local opinion was building up to the idea of a local college of science. The Mining Institute demanded a school of mining but the supporters of a more broadly based college had their way and, in 1871, the Armstrong College of Physical Science was set up. Although chairs in scientific subjects were established from the outset there was no chair in mining until 1880 when the leading coal owners of the area got together and endowed such a chair. The need for such a department was quickly demonstrated and the numbers of students of mining increased rapidly, so that by 1895 the college supplied more inspectors than any other institution.

At Sheffield, evening lectures in mining were begun at Firth College (later the University of Sheffield) in 1882 but no professor was appointed until 1892. Before this, however, a wide provision of lectures and classes had been established in a number of centres in Derbyshire, Nottinghamshire and the West Riding. This scheme began in 1891 and was supported by the County Councils and all classes of underground workmen were represented at the lectures. Lecturing at the college itself was confined originally to some Saturday afternoons and evenings and was at a fairly elementary level. The new professor began to develop more advanced teaching and in 1896 a Diploma in Mining was established and it was the introduction of this Diploma which for the first time brought full-time students into the College.

Nevertheless, by the turn of the century the accommodation reserved

for mining at the University was modest, consisting of two rooms, of which one, the laboratory, had cupboards for 17 students but provided comfortable working space for only six. Regulations had been set in order for a degree course but the Professor of Mining thought such a scheme impossible under the then existing conditions of accommodation, and was of the opinion that 'unless some steps are taken to remedy defects the Mining Department of the University of Sheffield will very soon be considerably behind compared with similar Departments of other Universities and Colleges (2, p 247)' In view of the fact that Sheffield was one of the foremost colleges with respect to mining this was a most serious statement to make. Even at Sheffield mining was not put on a proper footing until 1910 when, in response to an urgent appeal, the Drapers' Company of London donated £15,000, the City Council £12,000, and local coal owners £5,000 for the creation of a Department of Mining and Metallurgy. But the provision of teaching and facilities was not enough and it was necessary to make it easier for students to enter the College for although a three year full-time degree course had been offered since 1907 the first enrolments of full time degree students was not until 1919.

University College, Nottingham, founded in 1881 was set in the heart of a coal mining area but there were no chairs in mining or even geology until 1911. The Coal Mines Act of that year required a high standard of qualification from all colliery officials and it gave an added impetus to mining education. On the other hand evening classes in mining had been provided for part-time students since 1889 though there were no full-time day students until 1906. The establishment of a chair and a full department in 1911 was only made possible by offers of support from the royalty owners and colliery proprietors of the district. At least at Nottingham, unlike Newcastle, there was support from this quarter.

A chair of Geology, Palaeontology and Mining was established at Owens College, Manchester as early as 1874 and even prior to this there had been a lectureship in this subject. But this chair was not sufficiently well endowed and an appeal to the public for support realised only £3,800, which was contributed by seven individuals. The opportunity to make mining a part of the College provision was lost, for after this it was confined to geology. Not until 1905 was mining again elevated to the status of a chair.

At Birmingham, a Department of Coal Mining and Colliery Manage-

ment under a Professor of Mining had been established as early as 1883, but it was neglected and lapsed after a short time. It was not resuscitated until 1902. At the Yorkshire College of Science in Leeds a Department of Geology and Mining was created in 1874. A separate Department of Coal Mining was set up in 1877, the two departments becoming amalgamated in 1897 and subsequently being renamed the Mining Department. It is of interest that when the college was founded one of the three chairs created was entitled Geology and Mining but, significantly, the person appointed was a geologist, A. H. Green, who later became Professor of Geology at Oxford. One can safely assume that the emphasis in the department was on geology and not mining, and in any case, like all other similar colleges at the time, the standard of work was elementary. The position at the turn of the century was that graduates in mining or in metallurgy produced by the English universities every year numbered fewer than a dozen. In addition to degrees in mining, Newcastle, Birmingham and Sheffield had Diplomas in Mining but here too, numbers of qualified students were few. At Newcastle, for instance, between 1903 and 1912 only ten students gained the Diploma in Mining.

LOCAL MINING SCHOOLS

In 1862 a special sub-committee of the Lords of the Committee of Privy Council upon education consisting of Lord Granville, Mr Robert Lowe, and Sir Charles Trevelyan was appointed to consider the Royal School of Mines. In its Report it expressed the opinion that 'it is probable that besides the "schools of mines" of Cornwall, Bristol and Wigan already existing, mining schools will be gradually established in other parts of the kingdom and mining science will also be acquired by other means (13, p. 1).'

Probably no mining school serving a local need was more flourishing than that at Wigan. The foundation of this originated from a suggestion made by Mr Edward (later Lord) Cardwell, a prominent mine owner, to the trustees of the Wigan Blue Coat National School in 1857. As a result of talks between the trustees of this School and those of the Mechanics' Institution, Lyon Playfair (later Baron Playfair) and Captain Fowke of the Science and Art Department of South Kensington came to Wigan to address a special meeting. The outcome of the meeting was that it was decided to establish a mining school at Wigan and in

1858 'one room of moderate dimensions was obtained at the Public Hall (4, p 193)' The creation of what in reality was a technical college three years prior to the establishment of a similar institution at Liverpool (the School of Science) reflects great credit on Wigan, then but a small town of fewer than 30,000 inhabitants

The Headmaster appointed was Mr Brikenhead who was later also engaged in lecturing at the Liverpool School of Science and at Preston Mechanics' Institution On the 2nd August, 1858, classes were opened and fifty students enrolled The School immediately cooperated with the Department of Science and Art in London and in June 1859 there were 16 entries for the Department's examinations—seven in mining, six in geology, and three in chemistry At first the School led a precarious existence and, like that at Bristol, actually closed down for a time but when it reopened in 1868 the number of students increased year by year, and by 1875 one hundred and thirty students were under instruction The subjects studied were practical plane and solid geometry (30 students) machine construction and drawing (60), heat, light and sound (55), magnetism and electricity (60), inorganic chemistry (7) organic chemistry (8) geology (38) principles of mining (53) and steam (49)

Teachers at the school throughout the period 1859-1899 earned payment on results from the Department of Science and Art Examinations In the last year of these (1899) there were 342 students receiving evening instruction and the School earned £346 in grants

Like many another institution of its kind the School led a peripatetic existence and went from home to home These temporary quarters included the Conservative Working Men's Club, the Town Hall, the Free Grammar School and the Hope Street School A building of sorts was erected in 1882 next to the Free Public Library at a cost of £2,000 but the absence of a building more in keeping with the size and character of the School is understandable for it was wholly maintained by public subscriptions and as coal depressions were frequent occurrences it was not to be expected that large sums would be forthcoming for elaborate buildings Help came finally in 1887 when Mr John Henry Johnson of the Abram Coal Company left £5,000 to the school, and three years later money became available as a result of the Local Taxation Act Prior to this, support for the School came from the 24th and 25th Earls of Crawford, local MPs colliery companies and industrialists In 1897 a 'new building' appeal raised £50,000 and the list of subscribers was

headed by the Wigan Coal and Iron Company which gave £5,000. Thus, for over 30 years after its formation, the school received no assistance from central government funds other than the annual payments to teachers which averaged £100 to £300 per year. The faith of the citizens, industrialists and colliery owners of Wigan in their college was fully justified for it exists today as the Wigan Mining and Technical College which serves some 10,000 full-time and part-time students.

During the 1850s one of the most prosperous mining regions of the country was Cornwall and according to the 1851 Census of Population, there were 19,292 employed in copper mining and 12,255 in tin. Unlike the coal mining areas which were to go on expanding to give a peak of production of 287 million tons in 1913, the County of Cornwall was dominated by a decline in mining activity for the last three decades of the century accompanied by a mass emigration of miners and their families.

There were several early attempts to bring education to the Cornish mine workers. 'The year 1844 saw the formation of the Miners' Society, based at Redruth. This was an association of practical men familiar with the details of mining and with the construction of machinery who will meet for the interchange of ideas (11, pp 1-2)'. Later in 1859 there was formed a Miners' Association of Cornwall and Devon, the express aim of which was that of 'educating the miner' and thereby 'to aid in the improvement of a great industry, which contributes to our national wealth about £3,000,000 sterling per annum (12, p 1)'. This Association appointed a lecturer who had a peripatetic role and provided lectures in chemistry and mineralogy to miners in many parts of the county. The scheme received poor support until 1863 when the Association took the decision to join in the Department of Science and Arts examination scheme. These examinations were the mainstay of the Miners' Association for the rest of the century and represented for the miner the primary provision for part time study leading to qualifications in this field.

Unlike earlier attempts* to establish a viable scheme of mining education, the Miners' Association flourished and miners were instructed in

*In 1839 an experimental School was opened in Truro. It did not survive for long due to lack of support. Another attempt was made in 1853 by the Royal Institution of Cornwall. In 1859 this too was abandoned as the number of pupils attending was very small.

centres scattered throughout Cornwall and as a result mining schools were established at Camborne, Redruth, and Penzance. Of these the most significant was that of Camborne. This was erected at a cost of only £1,400 and classes were opened in 1883. The site and cost of building were donated by G. L. Bassett, a local landowner, and a few years later he also contributed the second section. The instruction consisted in the main of theoretical lectures run in conjunction with the Department of Science and Art, while the practical side of the training was undertaken during the daytime the students being placed in the different mines in the immediate locality.

Although these are commonly referred to as Schools of Mines no such terminology is found in the Annual Reports of the Department of Science and Art where they are referred to as 'Schools of Science'. According to the Report of 1886 there were such schools at Camborne, Penzance, Redruth, Truro and Liskeard and the number of students under instruction are given as 70, 35, 90, 14 and 6 respectively, making a total of 215, and the total payments to teachers from the Department of Science and Art amounted to £62 (6).

At Bristol the Mining School led a precarious existence. In 1860 there were 16 students at the School studying chemistry, mineralogy, geology, physics, drawing, and mathematics in addition to mining. Warrington Smyth confessed to the Devonshire Commissioners in 1870 that the Bristol School had ceased to lead a separate existence. It was based on the subscriptions of the colliery lessees of the coal proprietors but these dropped out one by one and the School became one of the classes of the Bristol Trade School.

Smyth pointed out to the Devonshire Commissioners that there was nothing in the way of a local mining or metallurgical school in the great smelting districts of Swansea and young men from that district travelled to the Bristol School until it was forced to merge with the Trade School. Owners of works in South Wales had been forced to procure managers from the Continent. Lionel Brough, too, claimed there were many Welsh boys at the school and that it would have been better attended had it been at Cardiff or Swansea. The wages bill he said, for one company in Dowlais alone was £400,000 a year and the cost of a school would be an infinitesimal fraction of this. He claimed that the wastage in the thick ten-yard seams of Staffordshire collieries could have been avoided if the viewers and lessees had better knowledge of mining engineering.

In 1872 at the time of the Devonshire Commission Report there were over 200 students at the Bristol Trade School. Of these, however, two thirds were studying at an elementary level and the remainder spread their studies over drawing, mathematics, chemistry, mineralogy and geology in addition to mining. In fact only six were studying mining and in attempting to assess the extent of mining education it is not much value in citing the numbers of students under instruction in mining schools. Mining was one of the subjects 'aided' by the Department of Science and Art and up until 1883 the annual reports gave the numbers of students actually studying mining as distinct from all the other subjects also aided by the Department. According to the 1883 Report (5) there were 435 students of mining in England and Wales and these were spread over a diverse body of establishments which included the Wigan Mining School, National Schools and British Schools, Miners' Institutes, Mission Rooms, Colliery Schools and Mechanics' Institutes. Perhaps the oddest of these was the Coffee Tavern which accommodated the group of 12 students (the only group in Wales) at Maesteg. The greatest number of students at any one institution was found at Wigan (seventy) but the leading region was Durham with 197 students despite the absence of a mining school and in Cornwall, despite the supposed existence of numbers of mining schools there were only ten students at Redruth. In addition to the paucity of students in Wales there was an almost complete absence of students in Yorkshire, Northumberland and the Midlands.

CONCLUSION

The Commissioners appointed to examine technical instruction (Samuelson Commission) after hearing all those who gave evidence concluded that

It is incumbent upon us to take care that our managers, our foremen, and our workmen should in the degrees, compatible with their circumstances combine theoretical instruction with their acknowledged practical skill (8, p. 513)

But they regretted that nearly all the higher educational institutions they encountered in their survey 'suffer more or less from the want of adequate funds to enable them to provide for such a staff of professors as is necessary for the proper subdivisions of the various subjects taught and for the equipment of apparatus and laboratories. In this respect the

provision in this country compares most unfavourably with that in the universities and polytechnics of the Continent (8, p 516)' And their final conclusion was that

The belief in the efficiency of training of the highest character is in England, at present small amongst those whom it will ultimately benefit The Englishman is accustomed to seek for an immediate return and has yet to learn that an extended and systematic education up to and including the methods of original research is now a necessary preliminary to the fullest development of industry It is to the gradual and sure growth of public opinion in this direction, that your Commissioners look for the means of securing to this country in the future as in the past, the highest position as an industrial nation (8 p 525)

This brief survey of mining education indicates that these conclusions would have been relevant in 1900 if not in 1914

Like all other fields of technical education the government was obsessed with the education of the artisan and the worker Despite the exhortations of Royal Commissions to lay greater emphasis on the education of the mine manager and despite the lip service occasionally paid to it, the government, having set up the Museum of Economic Geology and later the School of Mines took little further part in mining education at the highest levels This was clearly left in the hands of local agencies such as colliery owners, industrialists and philanthropists The result was that facilities for higher mining education were long delayed There were few departments and staff, accommodation was limited and financial support was lacking In the absence of a system of scholarships, fellowships and grants there were grave difficulties in the way of full time day instruction and inevitably the quality of study could not be of the highest The one inescapable conclusion that is forced upon one after examining the state of mining education is that original research was almost totally absent from the scheme of things

In the field of higher mining education where were mining engineers and mine managers to exchange ideas and learn of new developments and the introduction of new techniques? Fortunately this became possible through the activities of the Institution of Mining Engineers formed in 1889 with 1 239 members and the Institution of Mining and Metallurgy

formed in 1892 with 170 members. The immediate success of these two bodies pointed to the fact that there was enormous interest among the mining engineers and mine managers of the country in the profession and techniques of mining.

While the serious student of mining, the professional mining engineer, or the mine manager who wished to obtain theoretical instruction at the highest level, were inadequately catered for, the government made provision for the worker through its Department of Science and Art. But even here the onus was on a locality to establish a mining class by providing suitable accommodation and teachers and where local initiative was absent then there was no class in mining. The Department merely made financial awards to teachers on the basis of the results of their students in the annual examinations. Evening and part-time instruction was another characteristic of English technical education and students came to these classes (which were frequently held in wretched accommodation with no laboratories) after a twelve hour day and often fell asleep at their desks.

Nevertheless, something was being done in this area, because it was widely believed that what England needed was a better educated class of workers, theoretical studies were to be grafted on to the recognisably high degree of practical skill of the British worker. It is difficult to see where the evidence came from to suggest that industrial productivity and economic prosperity were related to the skills and knowledge of the worker. Whereas there was plenty of evidence to suggest that there was a correlation between productivity on the one hand and research and scientific management on the other. Why then was the education of managers so neglected? A laissez faire attitude certainly played a part in this but was it also due to the fact that British mining other than copper and tin which were in any case modest as producers of wealth compared to coal mining went from strength to strength and actually reached peak productivity in 1913.

Was the bad training of managers and the need for research and development hidden by increasing productivity based on such rich and easily obtainable seams? Was the legacy of this error reaped much later? One of us (GWR) recalls memories of being brought up in a Welsh mining village during the thirties when five collieries closed down during a decade. Local legend has it that their closure left an abundance of best Welsh anthracite unmined and that the forced closings were brought about by inefficient management.

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