

## Samuel Smiles and Technical Education.

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At first sight, Smiles does not seem to have thought formal technical education either necessary or useful.

One of the most remarkable things about Engineering in England is, that its practical achievements have been accomplished, not by natural philosophers nor by mathematicians, but by men of humble station, for the most part self-educated. (Smiles 1874 p. xvi)

Among these were some of Smiles' greatest heroes, such as James Brindley and George Stephenson. They learned on the job, a process which might itself be of varying value: the young George joined a large and efficient mining and industrial combine (the 'Grand Allies') where he could and did learn from others, but Brindley, having been apprenticed to an incompetent drunk, seems to have been genuinely self-taught.

Schools, academies and colleges, give but the merest beginnings of culture in comparison... far more influential is the life-education daily given in our homes... [and in various workplaces] (Smiles 1897, p 6)

School teachers get a very bad press from Smiles. Thomas Edwards learned almost nothing at school and was brutally beaten, James Nasmyth likewise. (Smiles 1877, p 34-35; Smiles 1889, p. 78) A protracted section in *Duty* begins 'How much time is spent in cramming children with useless knowledge... Physical force is at hand and is more generally resorted to'. (Smiles 1907, pp 401-05) Smiles himself had been told by his teacher that he would never be fit for anything except street sweeping. It was not just that teachers were not good at teaching anything useful, or that they mainly taught in a dull manner ill-suited to stimulating any form of interest: they failed in the fundamental requirement even of recognising, much less nurturing, young talent when they saw it. (Smiles 1897, pp 358-59) That same Nasmyth was apparently capable of turning accurate spinning tops in his father's lathe at the age of nine and a couple of years later was casting and boring miniature brass cannon. Others of Smiles' engineering heroes were portrayed as childhood prodigies, but their achievements were still more practical than scientific or mathematical, such as Watt's miniature cranes or Rennie's model ships. Smiles, when recounting Watt's death goes so far as to describe 'the father of thermodynamics' as 'The Great Workman', which is about as anti-science as one could get.

Similarly, John Harrison, the inventor of the chronometer, is said to have been fascinated as a child by moving machinery: 'When six years old and lying sick of small-pox, a going watch was placed upon his pillow, which afforded him infinite delight'. As it should, since his father was a carpenter, to whom the price even of a basic watch at the turn of the eighteenth century would be about seven weeks' wages. (Smiles 1905, p. 78) Surely not a literary device, Dr Smiles?

However, none of this emphasis on raw talent triumphing over formal education was entirely original. In 1820, for example, Cecil Hartley published a little book entitled *British Genius*

*Exemplified*<sup>1</sup> and we need read only part of the first page before we find the first biographee (the celebrated polymath, Sir William Petty) as a child ‘imitating some mechanics: in the management of whose tools he soon became as expert as themselves.’ The same is said of John Smeaton, one of several subjects common to both authors. Hartley does not find it necessary to claim a rise from poverty as an invariable achievement of the young men in question, but he does record that their choice of occupation was often the object of parental acquiescence rather than positive aid and approval. The essential difference is that Smiles’ biographical writing has a coherent philosophy in the background, or, in the view of those less charitable than I, an axe to be ground. It might be thought that matters become silly when Smiles advances the claims of perseverance as an especially important personal quality: perseverance has a necessary pre-condition, which is failure.

One of the peculiarities of Smiles’ judgement of the worth of an achievement, be it the design of a chronometer or an entire railway, is that worth is not absolute but relative. That is to say, an achievement is greater if it is made in the face of difficulties, and the greater the difficulties, the greater the achievement. In Harrison’s case the difficulty was the government refusing to pay promptly the premium promised to the successful inventor of a way of determining longitude when he had incurred the considerable expenditure of making four different chronometers. This was insufficient difficulty to satisfy Dava Sobel, whose highly successful *Longitude* of 1995 reinforced biographical convention by portraying Nevil Maskelyne, Astronomer Royal, as a malign and interfering schemer. In other cases mere mockery might hinder an innovator, as in the demolition of George Stephenson’s evidence before the Select Committee which considered the 1825 Liverpool and Manchester Railway Bill. Smiles might be accused of attacking soft targets, (the Admiralty and the legal profession seem neither of them to have been held in great public affection) but his points struck home.

It has often been said of Smiles that he was substantially influenced by G. L. Craik’s *The Pursuit of Knowledge under Difficulties* (London, 2 Vols, 1830) and Chapter 12 of *Men of Invention and Industry* is titled ‘Astronomers and Students in Humble Life: A new Chapter in the ‘Pursuit of Knowledge under Difficulties’, clearly supporting that view. However, Smiles is not there concerned with getting the underprivileged young to the starting line of life’s race: these particular members of ‘humble life’ are men already in poorly paid adult positions (one was a shoemaker, another a railway porter) who wish to conduct serious research and have to deploy Self-Help to obtain such necessities as telescopes. Such scientific activities would be much less meritorious if conducted by such as William Lassell, telescope builder – and wealthy brewer.

Because Smiles’ writings extended over more than sixty years, his views on a number of subjects naturally shifted to meet changing circumstances. If we compare his views on education in the 1840s and ‘50s with those he expressed in later life, not only did they change in detail, they changed in target audience and in overall objective as well. His 1840s agenda was basically that which he advocated in the evidence he gave before the Select Committee on Public Libraries (1848). Education was a matter of *political* education: in the troubled Chartist years it was possible for demagogues to stir up trouble with speeches which educated men would recognise as spurious, allowing the peaceful radicals to make their views heard. It was a fairly widely-held view, reflected in some large municipal investments, that exposing

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<sup>1</sup> Burdened with an impossibly long sub-title, it was published by Effingham Wilson of London.

the Intelligent Artisan to great books, works of art and music<sup>2</sup> would improve him. Of course, Smiles may also have wished working men to be able to read his own publications.<sup>3</sup>

But it is easy to confuse issues here: Smiles' great educational self-helpers mostly came to literacy and numeracy relatively late in life, when primary education had already failed them, and this, like his initial enthusiasm for Mechanics' Institutions involved adults being educated by choice, and thus fitting the *laissez-faire* template which is supposed to have been the foundation of his ideas on many subjects. In fact, I have found Smiles using the expression just once, and that in a spirit of angry condemnation. (Smiles 1907a, p. 376) Manly independence was the key aspiration, but it could not necessarily be achieved from a starting point of helplessness. In another context Smiles had admitted that some needed help to get started: 'The duty to help the helpless speaks trumpet-tongued.' (Smiles 1907a, p321) Thus, in a strongly-worded and combative open letter addressed to Edward Baines, Smiles asked 'Is the Voluntary Principle [of school provision] adequate to our National Exigencies?'<sup>4</sup> The reasoning behind his resounding negative was unambiguous: the substantial middle classes were willing to raise large sums for the building and running of churches, and of church schools but attempts at raising funds for non-denominational schools had failed lamentably.

Smiles urged the necessity of religious teaching being a specialist provision outside of the public schools, which should be non-denominational and concentrate on 'bridging over the gulph which now divides the poor and the rich'.<sup>5</sup> The motive remained, however, primarily political. A well-educated public – and *ipso facto* a more egalitarian one - would eschew extremism. A large extension of suffrage had been on the Smiles agenda for decades, and educated people could understand political issues and thus be safely enfranchised. The way this could be achieved was by providing sound free education to a basic level, organised by local committees acting on behalf of government. It is also possible that the pupils might be imbued with some of the Smilesian attributes of Self-Help, thrift etc which would enhance their chances of progressing to manly independence in the manner with which we have become familiar.

Smiles then went fairly quiet on education, and when he returned to the subject in 1867 it was in a different context, with a different intention and with an apparent reversal of the doctrine of the primacy of self-education.

The Great Exhibition of 1851 displayed the dominance of British industry to an admiring world, but by the time of the Paris Exhibition of 1867 it was clear that imitation is the sincerest form of praise, and that continental nations, notably France, Belgium, Switzerland, Austria and extensive parts of the soon-to-be-united German states had been doing a great deal of catching up in both quality and quantity of industrial output. This was not lost on British industrialists, scientists or engineers, but the question was, what could be done to regain the lost ground?

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<sup>2</sup> Smiles barely mentions music, but great civic instruments such as those in Birmingham Town Hall, or the even larger one in St. George's Hall, Liverpool were designed and used for popularising the great classics through the medium of organ transcriptions played at concerts accessible to those of modest means.

<sup>3</sup> I first found his 'Address to the Bradford United Reform Club' of 1842 in a bound collection in Manchester Central Library entitled *Political Tracts*.

<sup>4</sup> Report of a Meeting of the Lancashire Public Schools Association, Manchester, 1 December 1851.

<sup>5</sup> It is worth remembering that at this stage in his life Smiles had definite Unitarian connections, and non-denominational education was a consistent Unitarian policy.

There has long been an historico/cultural explanation of this, chiefly propounded by Martin Wiener and Correlli Barnett, who found an anti-industrial and anti-scientific culture prevalent in large swathes of the British upper middle classes.<sup>6</sup> To explain the emergence and spread of this culture, Wiener and Barnett needed either a large supply of individual villains or some sort of villainous body or bodies corporate to carry the blame. Even Matthew Arnold has been cited, (Duffy, M. C 1994.) probably because he referred to the bulk of the wealth-making class as 'Philistines'. The principal bodies to be demonised in support of the Wiener thesis were the Public Schools and the ancient Universities, which, it was said, taught little or nothing useful, though if this were true a most remarkable improvement occurred towards the end of the century: by 1903 8% of Cambridge undergraduates (224 in all) were reading engineering. (Burns 2006, p 45) This is a big side-issue to handle here, but if there was indeed such a cultural change (a comfortably vague term) it is doubtful whether it would necessarily have met with the approval of Matthew Arnold. In fact, in 1868, he published *Schools and Universities on the Continent* which made invidious comparisons between British and continental technical education. On the offence as charged, Arnold was clearly not guilty. The Wiener-Barnett axis knew well enough about the rising fears in educational circles, but chose to represent it as an aggravating factor: Britain was not blundering unknowingly into an economic dead end but marching knowingly and purposefully on that road, led by the muscular Christians produced at Eton and its rivals. Smiles, of course, was always willing to find the best in others and after recording some of Arnold Senior's supposedly reactionary utterances he went on to record that Thomas Arnold was thoroughly 'go-ahead' and was reported as saying of the London and Birmingham Railway 'I rejoice to see it, and think that feudality is gone forever. (Smiles 1860, p. 77)

Smiles seems to have published only one paper specifically on Technical Education, namely the text of a speech he delivered at the Annual Soirée of the Huddersfield Mechanics' Institute. (Smiles 1867) In some ways its argument is exactly what one would expect: success is a question of the artisan classes exhibiting self-help, but with the important proviso so often missed by Smiles' detractors that, as above, there was a duty to help the helpless.

That the poor boy should be started on the road of life with his poverty, is burden and calamity enough: that he should be started also with ignorance, is a still heavier burden and a still greater calamity.

In other words, basic general education should be a state provision to enable boys to embark on technical subjects: it is the concept of the starting line again.

In this, Smiles was following in the footsteps of such luminaries as Lyon Playfair (whose varied career included managing a textile printing works and occupying a chair in chemistry at Edinburgh University) and moving a little ahead of Matthew Arnold. He gave lengthy details of the ways in which the foreign industrial education system was superior to the British and to the visible results, in the shape of British industry being overhauled. Yet at the time he wrote this, he was still deeply committed to the *Self-Help* theme, *Self-Help* itself being the only book of the 'Social Gospel' series which had actually appeared by then. Perhaps more surprisingly, he undertook a substantial re-editing and updating of *Lives of the Engineers* which was published in 1874. The fundamentals of the role of self-enhanced inbuilt genius from earlier editions remain unchanged, and the message was reinforced with the appearance of the important *Men of Invention and Industry* (1884) and his edition of *James*

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<sup>6</sup> For further references and a ferocious attack on the Wiener thesis, see W. D. Rubinstein, *Capitalism, Culture and Decline in Britain 1750-1990*, Routledge, London, 1993.

*Nasmyth, Engineer, an Autobiography* the following year. In the former we should not be surprised to find, in an autobiographical essay by Sir E. J. Harland (of Harland & Wolff shipbuilding fame), that

As a youth, I was slow at my lessons; preferring to watch and assist workmen when I had an opportunity of doing so, even with the certainty of having a thrashing from the schoolmaster for my neglect. Thus I got to know every workshop and every workman in the town. At any rate, I picked up a smattering of a variety of trades, which afterwards proved of the greatest use to me.

Or that he then went on to build model yachts!

So seventeen years after Smiles had been converted to systematic technical instruction and advocated it as the only remedy for Britain's already-recognised relative decline, he was still peddling the Self-Help doctrine that schoolmasters were cruel, and useless with it. How could this be? As I have remarked before, Smiles was rarely inconsistent, and he was not in this case either. The apparent inconsistency is actually quite easily resolved. The different messages were for different recipients.

In 1867, the Society of Arts paid the expenses for a Coventry ribbonmaker named Joseph Gutteridge to join a delegation to the Paris Exhibition and report back on what he saw. (Gutteridge 1867) This episode, however atypical, illustrates not only that there was a perceived need to learn from the competition but also that the need was not restricted to millowners or engineers. Earlier, and in the public sector, all the employees of the Royal Dockyard, Chatham, had been given two days' holiday to visit the 1862 International Exhibition. One of the things that Gutteridge and others learned was that technical education on the continent was far superior to that in Britain. They were neither the first nor the last to observe this. It is strange that neither they nor, so far as one can see, anyone else, investigated the British Empire. The Roorkee Engineering College, near Delhi, provided a better technical education at a variety of levels than anything available in England in 1867 – and it had been doing it since 1847.

In his address on Technical Education, (Smiles 1867) Smiles showed that he was familiar with the worries of the more aware members of the industrial classes, whether proprietorial or artisanal, and the case of the shipbuilding industry is a useful one for considering the educational paradox.

The Huddersfield audience was apparently aimed at members of or aspirants to, the class often known as 'the aristocracy of labour': they had qualified or would qualify in their trade by apprenticeship, by learning on the job. Remaining with shipbuilding as the leading example, there were changes afoot which could fairly be termed epoch-making in the supersession of wood by iron and canvas by steam, giving early warning that the skills of the shipwright and the sailmaker were on notice of dismissal. Intelligent men recognised the need for change not just in their skills but in the mode of acquisition of the new ones they could see they would need. Given that what distinguished shipbuilders from house carpenters or iron shipbuilders from boilermakers was their skill in handling subtle curves, one would have expected fairly extensive re-training from wood to iron, but while this happened to a small degree in the Royal Dockyards, it was rare in private building yards.

As Smiles told his listeners, they needed to begin with a decent standard of literacy and numeracy: in any branch of engineering there was a growing need to be able to read written instructions and to work to drawings rather than patterns. This they seem to have been able to do, though in the event they did not have to do it as quickly or widely as they, or Smiles, expected: the use of comparators rather than measuring instrument, for example, continued into the 20<sup>th</sup> century, and while the use of drawings became much more widespread the amount of information they contained often remained small: much was left to be determined on the basis of workshop practice. Analogous ‘delegation’ of aspects of design to the execution existed in civil engineering. Reverting to shipbuilding, delegation seems to have involved some quite consequential details: it was not uncommon for sister ships of identical length and beam to have variations of several percent in gross registered tonnage. Cunard’s *Ivernia* and *Saxonia*, for example, were commissioned in 1900, both nominally of 14,000 grt, as ordered. As actually delivered they measured 14,067 and 14,281 tons respectively. Even a humble Mersey ferry could differ from its sister by a few tons.

The ‘other audience’ with which Smiles concerned himself, where he advocated self-education and in-born talent was one with a higher calling. A successful career nearly always began with a successful elementary education: some of the boys who would become premium pupils to leading engineers may have come of modest backgrounds, but few, especially among his later subjects, were actually as disadvantaged as Smiles said that James Brindley and George Stephenson were.

William Murdock was called upon to exhibit some of the virtues of self-help to get himself started, but for him the prize was not just to come in contact with and learn from the stellar James Watt, but to work in what was then the most advanced engineering works in history. Smiles (1905) provides a ‘novelte-length’ biography of Murdock, whose boyhood achievements were said to include building and riding a wooden horse moved by (unspecified) mechanical power.

Frederick Koenig, ‘the inventor of the steam printing press’ (Smiles 1905) was not pupil to an eminent man, but neither was he desperately poor or ignorant. Interestingly, his problem was that he could not find anyone in Germany willing to put money into the development of his press, and had to bring it to England: Smiles does not hesitate to praise British enterprise while criticising continental firms for their lassitude. Koenig was a product of one of those *Technische Hochschulen* which Smiles and others were so sure gave Germany a critical technological advantage. Ironically, while his press succeeded, the personal relationships which lay behind its construction. failed.

The people to whom the old ‘inbuilt genius’ hypothesis was really addressed were those marked out for the fairly closed world of elite consultant engineers. In terms of Roorkee grades, they were Grade 1, whereas the Huddersfield audience was grade 2 – aspiring to Principal Foreman status with the possibility of gaining a qualification from one of the Institutions later. ‘Grade 1’ commonly ran in dynasties of at least two generations and exceptionally many more.<sup>7</sup> One may recall the Brunels, the Stephensons, the Stevensons, and in Liverpool the Hartleys and the Lysters. This may seem a negative message to convey to a young man with lots of self-belief but without a father or an uncle to find him a place at the

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<sup>7</sup> The term ‘pupil’ is not used strictly here: in some cases the young men were junior assistants without indentures. They still got their chance.

top table. Not so, for there were non-familial dynasties, admission to which could be achieved by the exercise of certain well-known qualities.

The familial dynasties might also take in outsiders: when the Lysters in Liverpool ran out of sons and nephews they took in three members of the Brodie family, one of whom (John) became arguably the most important municipal engineer of the early twentieth century. The great dynastic exemplar, however, could be much longer.

The Chief Engineer for the building of the Manchester Ship Canal was Edward Leader Williams, pupil of his father, pupil of William Cubitt, pupil of Thomas Telford, pupil of William Jessop, pupil of John Smeaton. Smeaton is fairly generally recognised as the first full-time consulting engineer. The prize dangled for the successful self-taught genius was entry to this engineering elite and the route to salvation was self-help. That is, of course, why so little is made in *Lives of the Engineers* of their sometimes very large earnings, because salvation in the secular faith of Self-Help was not a matter of money but of usefulness to society.<sup>8</sup> There was more to it than that: Smiles has virtually nothing to say of the role of the salaried engineer despite the example of such as Sir Robert Rawlinson, probably the most effective public health engineer of the century: insult is added to injury by a paragraph in *Life and Labour* (Smiles 1887 p. 376) which contains one of the few mentions of public sanitation and cites two medics and no engineers. The omissions are stranger still when we recall that Smiles' father had died in the 1832 cholera pandemic.

What is going on? The best suggestion I can make is that Smiles was trying to help the engineering profession in its long quest for recognition as a gentleman's profession. Gentlemen did not receive salaries: gentlemen were in independent business, a status to which they had risen not by attending evening classes but by the exhibition of a truly noble and manly character.

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<sup>8</sup> Some of the elite engineers also had substantial earnings from other activities, such as George Stephenson from his coal mines and his limestone quarries. These are not concealed by Smiles, but they are treated as a beneficial economic activity rather than as a source of profit to their owners.

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Note on references.

The editions cited above are those which happen to be in the author's collection. For details of original dates of publication see A. E. Jarvis, An Attempt at a Bibliography of Samuel Smiles, Industrial Archaeology Review XIII No. 2, Spring 1991, pp 162-71.